Vol.Supp. Kytomaa

(Harri K. Kytomaa, Ph.D. Deposition Excerpts)

In The Matter Of:

Bonnie George, et al. vs.

Omega Flex, Inc., et al.

Harri Kaarlo Kytomaa, Ph.D.

Vol. I

September 24, 2019

Video Deposition

DORIS O. WONG ASSOCIATES, INC.

COURT REPORTERS

50 Franklin St., Boston, MA 02110
Phone (617) 426-2432

Original File Kytomaa_Harri.txt

Min-U-Script® with Word Index

Notes

Volume I
Pages 1 to 267
Exhibits 1 to 37

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MISSOURI

- - - - - - - - - - - - - - - - - - -X
BONNIE GEORGE, ED McKINZIE, TIM WORSTEL, CEDAR DERAPS, CASEY WASSER and TAMMY VOLKART,
Plaintiff,
vs.
OMEGA FLEX, INC.; WARD MFG., LLC; TITEFLEX CORPORATION; POWERCET CORPORATION; and GAS TECHNOLOGY INSTITUTE (GTI),
Defendants.
: Civil Action No. 6:17-cv-03114-MDH
- - - - - - - - - - - - - - - - - - -X

VIDEOTAPED DEPOSITION OF HARRI KAARLO KYTOMAA, Ph.D., a witness called by the Plaintiffs, taken pursuant to the Federal Rules of Civil Procedure, before Alexander K. Loos, Registered Diplomate Reporter and Notary Public in and for the Commonwealth of Massachusetts, at the Offices of Kirkland & Ellis, LLP, 200 Clarendon Street, 47th Floor, Boston, Massachusetts, on Tuesday, September 24, 2019, commencing at 8:59 a.m.

PRESENT:

Carpenter & Schumacher, P.C.
(By Craig M. Schumacher, Esq.)
E-mail: Cschumacher@cstriallaw.com
2701 North Dallas Parkway
Suite 570
Plano, TX 75093
972.403.1133
for the Plaintiffs.

(Continued on the following page)

PRESENT (Continued):

Kirkland & Ellis, LLP
(By Benjamin T. Kurtz, Esq.)
E-mail: Benjamin.kurtz@kirkland.com
300 North LaSalle Street
Chicago, IL 60654
312.862.7145
for the Defendant, Omega Flex, Inc.

Montgomery, McCracken, Walker & Rhoads
(By Charles Casper, Esq.)
E-mail: Ccaster@mmwr.com
1735 Market Street
Philadelphia, PA 19103
215.772.7223
for the Defendant, Titeflex Corporation.

Shook, Hardy & Bacon, LLP
(By Kristen A. Page, Esq.)
E-mail: Kpage@shb.com
2555 Grand Boulevard
Kansas City, MO 64108-2613
816.474.6550
for the Defendant, Ward Mfg, LLC.

ALSO PRESENT: Garner Willis, Videographer

* * * * *

I N D E X

* * * *

E X H I B I T S

E X H I B I T S, Continued

E X H I B I T S, Continued

E X H I B I T S, Continued

E X H I B I T S, Continued

* * * *

P R O C E E D I N G S

THE VIDEOGRAPHER: We are now recording and on the record.

My name is Garner Willis. I'm a legal video specialist from Stream Productions, in association with Doris O. Wong Associates, Incorporated.

Today is September 24th, 2019, and the time is 8:59 a.m. This is the deposition of Harri K. Kytomaa in the matter of Bonnie George, et al., Plaintiff, vs. Omega Flex, Incorporated, et al., Defendant, in the US District Court for the Western District of Missouri, Case Number 6:17-cv-03114-MDH.

This deposition is being taken at 200 Clarendon Street, Boston, Mass. 02116, on behalf of the plaintiff. The court reporter is Alexander Loos of Doris O. Wong and Assciates.

Counsel will state their appearances and the court reporter will administer the oath.

MR. SCHUMACHER: Craig Schumacher on behalf of plaintiffs.

MR. KURTZ: Ben Kurtz on behalf of Omega Flex.

MR. CASPER: Charles Casper on behalf of

09:00:59-09:01:18 Page 9

Titeflex.
MS. PAGE: Kristen Page on behalf of Ward Manufacturing.
HARRI KAARLO KYTOMAA, Ph.D.
a witness called for examination by the Plaintiffs, having been satisfactorily identified by the production of his driver's license and being first duly sworn by the Notary Public, was examined and testified as follows:
DIRECT EXAMINATION
BY MR. SCHUMACHER:
Q. Good morning.
A. Good morning.
Q. Would you please state your name for the record.
A. My name is Harri, middle name Kaarlo, Kytomaa. Last name is spelled -- actually, I'll spell all my names. First name H-a-r-r-i, middle name K-a-a-r-l-o, and last name K-y-t-o-m-a-a.
Q. What nationality is Kytomaa?
A. So my -- my last name is a -- is a -- is a Finnish name. It's a recognizably Finnish name.
Q. All right.
Dr. Kytomaa, we've met before, correct?

09:01:41-09:02:33 Page 10

A. We have.
Q. And my name is Craig Schumacher on behalf of the plaintiffs in this matter. And you're here, you understand, for your deposition in the George matter, correct?
A. That's my understanding.
MR. SCHUMACHER: All right.
And I'm going to show you what has been marked as Exhibit Number 1. That is a copy of the subpoena for your appearance here today.
(Document marked as Kytomaa Exhibit 1 for identification)
BY MR. SCHUMACHER:
Q. Do you recognize that?
A. Yes.
Q. All right.
And you've seen that document before?
A. I have.
Q. And have you produced the documents that are responsive to the subpoena?
A. I have.
Q. All right.
We received on Friday evening a series of 14,329 documents.

09:03:01-09:03:29 Page 11

Does that entail the entirety of your file in this matter?
A. I'm not sure I know to answer that question. I mean, I haven't counted every document. So my counting is different from yours, so I don't know the answer to that question.
Q. All right.
You turned over all of your file to defense counsel; is that correct?
A. I have.
Q. And they made the production in this matter?
A. That's my understanding. You would have to ask them.
Q. Okay. Fair enough.
I'm curious, right off the bat.
You have done some SPICE simulations and modeling in this matter to support your opinions; is that correct?
A. That's correct.
Q. Did you turn over, as part of your production, any of the underlying data that went into the SPICE calculations?
A. I expect that we did, but I'm not sure.

09:03:51-09:04:34 Page 12

Q. All right.
Would you agree that that's an important part of your opinions is the SPICE calculations that -- that you've done in this matter?
A. I think the SPICE calculations are part of my report, yes.
Q. All right.
Do you believe that we should be entitled to review the number of simulations that you did?
MR. KURTZ: Object to form.
A. I -- I can't judge what you think is -- is important to you.
I've provided the simulations in my -- in my, let's say, discovery materials.
Q. All right.
How many simulations did you perform with regard to your work in the George matter?
A. I performed two.
Q. All right.
So you only -- you loaded up the data into SPICE for just the two simulations?
A. Yes. The two, and the conditions for those two that I spell out in the report.
Q. Okay.

09:26:30-09:27:17 Page 29

upon, or what opinions were you brought in to provide?
A. Opinions as a mechanical engineer.
Q. All right.
Let's go down to the second paragraph:
"The plaintiffs in this matter have asserted that all structures with TracPipe, WardFlex and Gastite CSST must have the CSST removed due to the potential for perforation of the CSST resulting in a fire during a lightning strike."
Did I read that correctly?
A. Yes.
Q. And where did you get that information? Is that from the plaintiffs' complaint in this matter?
A. Yes.
Q. All right.
"However, the overall risk of lightning-induced perforation of CSST is quite low."
Did I read that correct?
A. Yes.
Q. How do you quantify "quite low"?
A. Well, the risk -- first of all, the risk

09:27:51-09:28:39 Page 30

of -- of having a fire in your home in association with -- with lightning is low, and -- and furthermore, the -- the fire being lightning-induced in association with a perforation of CSST is much lower than that, and that's what I mean by that.
Q. All right.
Do you agree that yellow-jacketed CSST is capable of being perforated from the current from a indirect lightning strike?
MR. KURTZ: Object to form, vague.
MR. CASPER: Titeflex joins in the objection.
A. I'm not sure I can completely answer your question. The -- as you've stated it.
Q. All right. Then I'll ask it a different way.
Do you agree that there are circumstances that exist where yellow-jacketed CSST can be perforated by the electrical current from a lightning strike?
MR. KURTZ: Same objection.
MR. CASPER: Join.
A. Same difficulty answering the question.
Q. What is your difficulty with the question?

09:29:01-09:31:07 Page 31

A. I don't know what you mean by "yellow-jacketed CSST." There -- there are -- in this particular matter, there are three manufacturers, all of which manufacture different -- different products that have different characteristics.
MR. SCHUMACHER: All right. Then let's skip to that point.
I'm showing you now what I have marked as Exhibit Number 4.
(Document marked as Kytomaa Exhibit 4 for identification)
BY MR. SCHUMACHER:
Q. Please take a look at that.
MR. SCHUMACHER: It's Number 46 for you, Counsel, in Volume 2.
Q. The first page of Exhibit Number 4 is Page 80 of 264 from the SEFTIM I report.
Are you familiar with that report?
A. I am.
Q. All right.
So let's talk a little bit about CSST in general.
"The manufacturing process for CSST

09:31:29-09:32:28 Page 32

seems to be the same worldwide."
Do you agree with that statement?
A. I don't.
Q. What differences do you observe in the manufacturing process?
A. I know that the -- the various companies that manufacture CSST compete for the same market, and they -- they protect their trade secrets carefully. And I understand that the -- the manufacturing processes differ from one another to the point where some manufacturers believe that their processes are perhaps more efficient or perhaps more cost effective than others. So I think that there are significant differences in -- in the process that actually have an impact on -- on how they succeed in the marketplace, for example.
Q. Well, then let's -- let's break that down even further, then.
Do you agree that TracPipe, Gastite and Ward yellow-jacketed CSST are all manufactured from 302 stainless steel?
A. I don't.
Q. How do you disagree with that statement?
A. I just disagree with that statement. I

09:32:48-09:33:45 Page 33

think that's an incorrect statement.
Q. All right.
Which manufacturer uses a different stainless steel?
A. They all do.
Q. They all use -- well, they all have different suppliers, I would assume, correct?
A. I would expect so, yes. But I don't specifically know who the suppliers are.
Q. Have you done any testing to compare the effectiveness of bonding and grounding on Gastite compared to Titeflex -- I mean Gastite compared to TracPipe compared to Ward yellow jacket?
A. I have.
Q. When?
A. I don't remember the date.
Q. What did that testing entail?
A. It entailed, for example, the -- the measurement of the different characteristics of those products, including things like the -- the thickness of the dielectric insulating jacket as well as the dielectric strength of -- of the jackets of the various products.
Q. All right.

09:34:28-09:35:41 Page 34

So you've done measurements on -- but have you done any lightning testing to determine the -- the physical parameters of the CSST and their performance under lightning conditions?
A. I mean, over the -- the course of time I've performed tests on various products that relate to -- to that area, including susceptibility of -- or let's say the performance of CSST products made by different manufacturers in the presence of a -- a lightning-induced fire. I've also performed testing for the propensity for the ignition of -- of gas, fuel gas associated with an electrical arc that is -- that impacts different manufacturers' products.
I think those are -- those are the different kinds of tests that I have done that I believe are responsive to your question.
Q. Actually, that's an interesting point.
I've seen many of your reports before, and you have always commented on the ability of fugitive gas escaping from an arced hole in CSST, whether or not it will ignite.
And that's not contained in this report at all, correct?

09:36:03-09:36:41 Page 35

A. The -- the testing is not spelled out in the report, but it may be in the -- in the materials that we have provided, but I have not checked.
Q. All right.
You have provided no opinions in this matter with regard to the ability of gas to ignite from -- escaping from an arced hole in CSST, correct?
A. That's correct. I have not spelled that out in this report.
Q. All right.
I would like you to turn to the second page of Exhibit Number 4.
If you look at the bottom -- this is actually from the GTI report:
"Results:
"The laboratory testing established the physical parameters of the CSST samples and that the product from the" four -- excuse me -- "from four different manufacturers exhibited substantially uniform parameters."
Did I read that correctly?
A. Yes, you did.

09:37:07-09:37:57 Page 36

Q. Turn to the next page, please, also from the GTI report. Number 1:
"The physical properties of the CSST product are reasonably repeatable from sample to sample and across manufacturers."
Did I read that correctly?
A. You did.
Q. Do you agree with that statement?
A. I don't. I think that both on the point, the second point there, across manufacturers, I know that the -- you know, in accordance with my own measurements and, you know, that I have spelled out in my -- my report that you have in front of you, they're not the same. They're not the same from the standpoint of -- of the performance of the corrugated steel, both from the standpoint of its geometry and things like flex -- flexibility and metallurgical treatment. But also they're not the same from the standpoint of the dielectric strength, thickness of the insulating layer and generally the feel of the -- the dielectric layer, which -- which is important for the purpose of how the -- the product functions in its intended use.
Q. So ultimately that conclusion contained on

09:38:33-09:39:14 Page 37

Page 10 of the GTI report, Page 3 of Exhibit 4 here, you disagree with GTI with regard to that conclusion?

A. Yeah. I mean, I disagree.

I mean, there's a couple of reasons why I disagree. One relates to the fact that GTI had a very narrow focus. And I think, generally speaking, the -- you know, these are certainly different products and mechanically perform differently as well as electrically.

MR. SCHUMACHER: Objection, nonresponsive.

Q. Let's turn to the fourth page of Exhibit Number 4, Page 29 of the GTI report. "Initial" -- in highlight:

"Initial experimental work measured baseline parameters of CSST samples from several manufacturers and verified that there was little variation from manufacturer to manufacturer."

Do you agree with that statement?

A. Well, I'm not sure what they mean by "little variation," but there is quite a bit of variation, and I actually spell some of that variation out in my own report.

09:39:45-09:40:38 Page 38

Q. So ultimately, "yes" or "no," do you agree with that statement that's contained on Page 29 of the GTI report, Page 4 of Exhibit 4?

A. I mean, I don't really know what they mean by "little variation." I mean, clearly it recognizes that there is variation. I agree with that. And exactly what they mean by "little," I would -- I personally would not use that word.

Q. So therefore the GTI report has certain conclusions that -- that are at least called into question by you?

MR. KURTZ: Objection, asked and answered.

MR. CASPER: Join in the objection.

A. No. I think that the -- the -- I'm -- I'm answering the question specific to certain sentences in the GTI report, and I -- and actually I disagree with the representation that you just made.

Q. Okay. Let's go to -- back to Exhibit Number 3, the table that's contained on the next page, Roman numeral xvii.

This is just in chart form to demonstrate some of the factual findings that you found by conducting inspections of the nine plaintiff homes; is that correct?

09:41:16-09:44:37 Page 39

A. That's correct.

Q. All right. I want to go to the first one, the "estimate of CSST length."

You were able to come up with a number for the number of feet of CSST in each structure; is that correct?

A. Yes.

Q. All right.

I want to go down to the "resistance to ground."

The -- the first one -- and forgive me on the pronunciation. Is it Deraps or --

A. That works for me.

Q. You don't know, either? Okay. That's fine.

There's no resistance to ground on that one?

A. That's correct.

Q. Why is that?

A. The reason is that I don't believe there was ready access to a grounding electrode.

Q. All right.

Well, you would agree with me, without that information you could not have performed any

09:45:01-09:47:52 Page 40

accurate SPICE calculations with regard to the Deraps' house?

A. One could have performed SPICE calculations, but one would have then -- we would have had to -- to bracket, if you will, sort of do calculations for assumed values, or multiple values.

Q. All right.

So either you have to assume a value, correct, a specific value, or you would have to run it a number of times with various resistance numbers for the ground?

A. Within a range of, you know, what are reasonable values, yes.

Q. All right.

The same question for the -- the Rehm -- R-e-h-m -- there is -- again, there's no ground, resistance-to-ground calculation there, either.

Do you have a reason for that?

A. The -- the reason for not performing that calculation is that the gas systems or the measurement in the Rehm house is the gas system was not directly bonded to a grounding electrode.

The -- in the -- just in contrast, the Deraps, in the Deraps matter there was a bonding

09:56:39-09:59:39 Page 45

MR. CASPER: Object to the form of the question.
Q. And by that I'll just say that type of report. Let's start with that.
MR. CASPER: Same objection.
A. I'm not sure I can make any representation regarding the type of report that Exhibit 5 is, other than to say that I have seen one or more LTI reports in the past.
MR. SCHUMACHER: I'm going to show you now what I have marked as Exhibit Number 6.
(Document marked as Kytomaa Exhibit 6 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. Have you seen that document before?
A. I -- I may have seen this, this document before.
Q. Well, I would hope so, because that's EXPONENT 10623. That was a document that was produced by you, or by your attorneys in this matter.
A. Yes.
Q. So is that something you reviewed or not?

10:00:06-10:01:04 Page 46

A. I've reviewed parts of this document.
Q. Okay. Let's go back to Exhibit Number 5, then, please.
This is -- Exhibit Number 5 is an August 14th of 2008 LTI test report for work done on behalf of Gastite corporation, or Gastite -- Titeflex Corporation, correct?
A. Yes.
Q. Have you had testing performed by LTI in the past?
A. I have.
Q. Do you believe LTI is a reputable laboratory?
A. I think they have their strengths and weaknesses.
Q. Have you relied upon data that you've received from LTI in the past?
A. They have unique capabilities that I have relied upon, but -- but I've had to oversee the testing that was performed at LTI.
Q. Have you ever received data from LTI that you did not concur with?
A. Yes.
Q. Can you give me an example?

10:01:45-10:02:40 Page 47

A. Yes.
I've taken issue with some of the -- the approaches and measurement approaches that they've utilized and -- and the -- the way, for example, that they would puncture, or pre-puncture CSST and introduce a -- an ignition wire into the -- into the -- the puncture that they created.
That's just one example.
Q. All right.
Well, let's go to Exhibit Number 6, then, please.
A. Yes.
Q. On the bottom, it's the abstract, EXPONENT 10625.
A. Yep.
Q. Well, first of all, you would agree with me that it's common in the industry to pinprick the yellow jacket when conducting testing?
A. Yes. That has been done. I mean, that's been done in a variety of ways, and -- and that's one of the issues that I have. And also exactly what way it is done seems to have varied, and -- and little attention has been given to that.
Q. Let's go to the bottom paragraph of Exhibit

10:03:08-10:03:40 Page 48

Number 6, EXPONENT 10625.
"The simulated lightning testing included preparing the sample by breaching the jacket only. Based on the field failures reviewed by Omega Flex, the jacket can easily and is usually breached during installation; although for the testing, the breach was required to assist in the discharge."
Well, first of all, did I read that correctly?
A. Yes, you did.
Q. So you would agree with me that, at least from Omega Flex's perspective, they have seen situations where the yellow jacket is damaged or perforated as a result of installation?
MR. KURTZ: Object to form.
MR. CASPER: Join.
A. So it's difficult -- difficult for me to really comment on this. This is a report that is issued by LTI making representations of -- of Omega Flex's. So, I mean, I think that you would have to talk to the people at LTI as to exactly how they came to that conclusion, or talk to the people that

10:04:06-10:05:08 Page 49

the LTI people talked to who are at Omega Flex that made those representations if those are true.

Q. You would agree with me, though, if there is a perforation in the yellow jacket, that would essentially defeat the dielectric strength with regard to electrical current?

A. It depends, because the -- the question really is, is whether the perforation is at a location where there may be an electrical insult or not. And so I think that if -- if there is a -- let's say a perforation that is -- that is caused during installation, as EXPONENT 10625 states, the -- the breach in the electrical insulation is not really a breach if that location is never electrically challenged.

Q. If that area of a breach is electrically challenged, it will have effectively defeated the dielectric strength of the yellow jacket, correct?

A. If you specifically, let's say, create a sufficiently high voltage to create the electrical breakdown of the air surrounding that particular breach, then yes.

MR. SCHUMACHER: All right.

Tell you what. We've been going about an

10:19:58-10:20:31 Page 50

hour. Why don't we go ahead and take a quick break.

THE WITNESS: Okay. Thank you.

THE VIDEOGRAPHER: The time is now 10:05, and we're off the record.

(Recess taken)

THE VIDEOGRAPHER: The time is now 10:19, and we're back on the record.

MR. SCHUMACHER: And Craig Schumacher.

For the record, I have agreed that an objection by one defendant is an objection for all, so that they do not need to join in.

Q. All right.

Dr. Kytomaa, let's go back to Exhibit Number 5, please.

A. Yes. Titeflex.

Q. So again, this was a LTI report for work done on behalf of Titeflex, correct? August 14th of 2008.

A. That is my understanding, yes.

Q. All right.

I would like you to turn to page, the lower right-hand corner, Bates number 528.

And, for the record, it's 120528, but -- all right.

10:20:59-10:21:32 Page 51

There's a table, 7 1-4 at the top.

Do you see that?

A. 7 1?

Q. 7.1-4.

A. Yes, I do see that.

Q. And on the bottom, "7.2.1, 15 February 2008."

Do you see that?

A. Yes.

Q. All right.

I just want to confirm, again. So about the halfway-down sentence begins, "Since the sample..."

Do you see where I'm reading?

A. Yes.

Q. "Since the sample had a relatively thin jacket, it was decided to pre-puncture the dielectric jackets to provide a more consistent method of applying the test currents."

Did I read that correctly?

A. Yeah.

If you can give me a minute just to read this paragraph so I understand the context.

10:22:10-10:22:56 Page 52

Q. That's fine.

A. Thank you.

Yes, I've read it.

Q. All right.

And again, I was really just reading that for the proposition that it's fairly common during LTI testing to puncture the yellow dielectric jacket, correct?

A. Well, I mean, this paragraph explains in the middle of the paragraph -- if you look just a sentence before, it says:

"During Test 8, the jacket" had "flashed" -- "the jacket flashed over the surface of the dielectric to the end of the tube."

So basically what -- if you impose, let's say, a high voltage in the proximity of the -- of the -- this particular product, Gastite product, it won't easily, let's say, breach the dielectric of -- of the product. And in that particular case, the current actually went all the way to the end of the tube where it found sort of a cut metal, metal end. And so it really speaks to the -- the fact that the dielectric makes it difficult for -- for an arc

10:29:30-10:30:43 Page 57

Q. Gastite with jacket removed, no melt-through at 3.9 coulombs.
Do you see that?
A. I see that.
Q. All right.
And actually there was a series of tests -- 40, 41, 42, 43 and 44 were all conducted with Gastite CSST with the jacket removed, correct?
A. Yes.
Q. All right.
Would you agree that in tests 40 through 44 the Gastite CSST was exposed to the same waveform as in Test Number 15?
A. No, they weren't.
Q. What waveform were 40 through 44 exposed to that -- and how was it different than in Test 15?
A. The -- the waveforms in 40 through 44 were different in magnitude.
Q. How?
A. They were of larger magnitude.
Q. The peak current was higher?
A. Yes.
Q. All right.
So even with a higher peak current, in

10:31:18-10:32:32 Page 58

Tests 30 -- excuse me, Test 40, 42 and 44, without the yellow jacket, the CSST, the actual stainless steel in that case was able to withstand 3.9, 4.4 and 4.4 coulombs respectively without having a melt-through, correct?
A. For those specific tests, that's correct.
Q. All right.
But the -- in Test 15, the Gastite CSST with a yellow jacket, at only 120 kA, it did suffer a melt-through, correct, at .17 coulombs?
A. So, I mean, the -- the -- you're singling out Test Number 15, but if you look at, for example, Test 9 to --
Q. Just answer my specific question.
A. Okay. So with respect to your -- those specific lines in the table, that's correct.
Q. All right.
So let's go back to Exhibit Number 3, please, your report. And let's go to Page 166 of your report.
A. Yes.
Q. I would like you to go to the last paragraph.
A. Yes.

10:33:02-10:33:31 Page 59

Q. "The plaintiffs further claim that unjacketed CSST is as much as 25 times more resistant to puncture from exposure to electrical energy than yellow-jacketed CSST."
Did I read that correctly?
A. Yes.
Q. "No document or reference is provided in support of this assertion, and I am not aware of any testing performed that supports this claim."
Did I read that correctly?
A. Yes.
Q. It's your position that the testing done that's shown in Exhibit Number 5 does not support that statement at all?
A. Well, my -- what I say in my report is that:
"No document or reference is provided to support this assertion..."
That's what I said. So that's probably accurate, that I did not see a reference that was provided in support of that assertion.
Q. Does Exhibit Number 5 seem -- support the

10:33:57-10:36:49 Page 60

contention that unjacketed CSST is capable of withstanding significantly more -- I won't even use the word "significantly"; I'll use the exact number -- 3.9 or 4.4 coulombs, whereas the yellow-jacketed CSST failed at -- or punctured at 0.17 coulombs?
MR. KURTZ: Object to form.
A. And the -- the lines that you were referencing were Test Number 15?
Q. Yes.
A. And what was the other test?
Q. The other tests are 40 through 44.
A. Yeah. So in Test 40 to 44 there was no melt-through with the jacket removed in Tests 40, 42 and 44 that had change transfers of 3.9, 4.4 and 4.4, and there was melt-through with -- with Test 41 and 43, with charge transfers of 4.9 and 4.4 respectively.
So what that speaks to is the fact that it's -- let's say there's variability in the testing.
And those charge transfers are higher than the 0.17 of Test Number 15 that has a melt-through, although the tests that were performed of Gastite

10:37:40-10:38:28 Page 61

with pinhole also has variability in it, in the sense that the conditions that result in melt-through varied. If you look through Tests 12 to 15, that's what -- what that shows.

Q. But ultimately -- I mean, the document speaks for itself -- the testing speaks for itself -- that without a jacket, Gastite was able to withstand 3.9 coulombs at a 10 x 1,000 waveform, with more peak current than in Test Number 15 with a jacket where it melted through at .17 coulombs.

MR. KURTZ: Objection.

Q. Correct?

MR. KURTZ: Asked and answered.

A. So -- so that is correct.

But recognize that the -- the -- I mean, you're comparing two somewhat artificial conditions. One is a -- Test 15 is Gastite with -- with a pinhole -- and putting the pinhole onto the -- onto the jacket actually will change its performance electrically -- to a Gastite with a jacket removed.

But -- but I think that -- I agree that the -- the tests in this report speak for themselves. These are the results that they obtained of the tests.

10:39:05-10:40:04 Page 62

MR. SCHUMACHER: Objection, nonresponsive after "that is correct."

Q. All right. Let us go back to your report, then.

Let's go back to Roman numeral xviii.

You have pointed out, under the "CSST Background" -- I'm going to paraphrase here without reading -- that CSST has certain advantages over black iron pipe, flexibility being one, correct?

A. Yes.

Q. Which may mean that it is less susceptible to damage during an earthquake, correct?

A. And -- and other situations, yes. Correct.

Q. All right.

In any of the nine plaintiffs' homes that were inspected, did you observe any damage due to earthquake or flooding?

A. In our inspections to the -- of the nine named plaintiffs' houses, we didn't observe any damage to the CSST.

But Missouri is susceptible to both earthquakes and flooding.

Q. That wasn't my question.

I asked if you observed any evidence -- did

10:40:23-10:41:00 Page 63

you see any evidence of damage to the CSST in any of the homes?

A. Based upon --

MR. KURTZ: Just object. That wasn't the question. The witness answered the question.

A. Based on my inspection of the nine plaintiffs' homes, I observed no damage to the CSST that we inspected.

But Missouri is susceptible to flooding and earthquakes.

Q. All right.

Did you observe any evidence of damage to the black iron pipe in any of the nine plaintiffs' homes --

MR. KURTZ: Object to form.

Q. -- that you would associate earthquakes or flooding?

A. Based on our -- our inspections of the nine homes that we inspected in Missouri, we observed no damage to the black iron pipe that was installed in those homes, although Missouri is susceptible to flooding and earthquakes.

Q. Did you observe any damage due to corrosion of any of the black iron pipe in any of the nine

10:41:34-10:42:39 Page 64

plaintiffs' homes? Or church. I should add that.

A. The -- in our inspections of nine homes and -- and the church, we did not see any corrosion of the black iron pipe that would constitute, let's say, a precursor to a leak of the black iron pipe.

Q. All right.

You would agree with me that CSST is more susceptible to crushing damage than black iron pipe?

A. Yeah. I mean, I think that depends.

I mean, one would have to look at what the circumstance is associated with the force that sort of delivers the crushing, because significant forces on CSST can be accommodated by simply the CSST deflecting in some fashion, whether it is the diameter itself deforming, but still containing the gas, or simply the movement of the -- of the flexible CSST.

That, in general, is not true for black iron pipe. Black iron pipe, if subjected to significant forces, can fail, and can fail dramatically.

MR. SCHUMACHER: Objection, nonresponsive.

Q. What about nail strike damage? Which would be more susceptible to nail strike damage, CSST or

10:43:01-10:43:57 Page 65

black iron pipe?
A. So if CSST is installed property -- properly, it should be installed in a manner to have some protection against nail strikes.
But -- but in answer to your question, if one were to perform a test outside of a home, and simply, you know, quantify, for example, what is the force required to penetrate black iron pipe with a nail or what is the force required to penetrate CSST with a nail, the force required to penetrate CSST with a nail would be smaller.
Q. And you would agree with me that black iron pipe is capable of withstanding more electrical current than CSST without perforating?
MR. KURTZ: Object to form.
A. I have difficulty with your question because in a home CSST -- I'm sorry, black iron pipe is typically installed in the context of appliances and things like this. And to the extent that one is delivering significant current to the black iron pipe that is then connected to, for example, a flexible gas connector, that combination may be problematic.
Q. Well, let me ask it this way, then:

10:44:23-10:45:13 Page 66

In your years of experience, have you ever observed a section of black iron pipe that had a perforation mid-run due to exposure to lightning?
A. I have.
Q. When was that?
A. It was associated with a lightning event where an underground gas line was perforated by -- by the lightning event.
Q. When was that?
A. Some years back. I don't -- I don't specifically remember the year.
Q. Where was that?
A. I think it was in Pennsylvania.
Q. Do you have any more details than that? Where? Was it a home? Was it a residence? Was it a commercial building?
A. No, it was not a home. It was a underground black iron pipe that was associated with distribution of gas, and it was proximate to, or near a utility pole.
Q. Were you with Exponent when you were doing that investigation?
A. Yes.
Q. How many investigations have you conducted

10:45:56-10:47:04 Page 67

involving CSST where there was an allegation that it perforated due to exposure to lightning?
A. I don't have an exact number, but it's probably of the order of 100 or more.
Q. When is the first time you did a CSST investigation? And we can use that term broadly. Hopefully you'll give me that.
A. I first became involved with work related to CS -- CSST in -- in the early 2000s, so more than 15 years ago.
Q. All right.
Let's get back to Exhibit 3, Roman numeral xviii.
You're drawing a comparison between black iron pipe and its ability to -- I'm sorry, the third paragraph of "CSST Background" and let's just go to the second-to-last sentence. "In addition, the yellow jacket..."
Do you see where I am?
A. I do.
Q. "In addition, the yellow jacket on CSST (for TracPipe, WardFlex and Gastite) has electrically insulating properties."
Did I read that correctly?

10:47:19-10:48:04 Page 68

A. You did.
Q. "This makes electrical arcing less likely to occur for CSST than for black iron pipe."
Did I read that correctly?
A. That's correct.
Q. So that's just saying that if there's an opposing charge in the same proximity to the insulative jacket of CSST versus black iron pipe, it's more likely to -- to arc off to the black iron pipe, correct?
A. Yes.
I mean, a very good example was what we looked at in the -- in one of the LTI reports a little bit ago where -- where the insulating characteristics of the CSST prevented the arc from attacking the metal and instead traveled some distance to the end of the CSST where the metal is bare.
MR. SCHUMACHER: Objection, nonresponsive.
Let us go to what I'm marking as Exhibit Number 7.
(Document marked as Kytomaa Exhibit 7 for identification)

10:49:09-10:50:12 Page 69

THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. Have you seen that document before?
MR. SCHUMACHER: Tab 14, Counsel.
MR. KURTZ: All right.
A. I have.
Q. All right.
This is a United States patent application dated February 24th of 2011 issued by -- or for the inventors Scott Duquette and Brian Coppola; is that correct?
A. Yes.
Q. And this is basically the patent application for Flashshield, Gastite's enhanced CSST product, correct?
MR. CASPER: Object to the form of the question.
A. Patent applications are not specific to commercial products, and so I would say that it may be that -- that Titeflex practices the invention as identified in the claims in the back of this patent application, or it may be that Flashshield practices this Patent Application Number 0041944 A1.
But I would have to, you know, essentially

10:50:52-10:51:21 Page 70

perform a claims analysis to answer that question, which I haven't done.
Q. Okay. Well, can you at least agree that it is a United States patent application publication?
A. It is.
Q. And it's dated February 24th of 2011?
A. It is.
Q. All right. If nothing else, just for documentary purposes for our record.
Okay?
A. Very good.
Q. If you will then turn -- there's a series of diagrams. When you're done with the diagrams, you actually come up to a Page 1.
A. I see that.
Q. All right.
And I'm going to go down under "Background of the Invention."
A. Yes.
Q. Do you see where I am?
A. I do.
Q. All right.
"Gas and liquid piping systems utilizing corrugated stainless steel

10:51:39-10:52:17 Page 71

tubing ('CSST')" --
A. Yes.
Q. -- "and fittings are known."
Correct? Or did I read that correctly?
A. You did.
Q. All right.
"Such piping systems can be designed for use in combination with elevated pressures of up to 25 PSI or more and provide advantages over traditional rigid black iron piping systems in terms of ease and speed of installation, elimination of onsite measuring, and reduction in the need for certain fittings, such as elbows, tees, and couplings."
Did I read that correctly?
A. Yes.
Q. Next sentence:
"Undesirably, the thin metal walls are vulnerable to failure when exposed to physical or electrical forces, such as lightning or fault currents."
First, did I read that correctly?
A. You did.

10:52:43-10:53:08 Page 72

Q. Do you agree with that statement?
A. I mean, I think it depends on the specific installation.
And so generally, I would not agree with -- with that statement.
Q. All right.
Let's go down to a little bit further. The next one is paragraph 006 -- or 0006.
Do you see that?
A. Yes.
Q. The -- towards the bottom of that paragraph:
"While both direct and indirect currents..."
A. Yes. I see that.
Q. Okay.
"While both direct and indirect currents may enter a structure through a particular system" --
A. Actually, hang on.
Yeah. I see that, yeah.
Q. Okay.
-- "voltage can be induced in other systems in the structure, especially those

10:53:25-10:54:09 Page 73

in close proximity to piping systems."
Did I read that correctly?
A. Yes.
Q. "This can often result in an electrical flashover or arc between the adjacent systems."
Did I read that correctly?
A. You did.
Q. Do you agree with that statement?
A. I think that if a -- if a Gastite product, the yellow Gastite product were installed in accordance with the manufacturer's instructions, then -- then I would not agree with that statement.
I think that the statement is a little bit -- let's say it's -- it's misleading because there are specific things that actually protect against this very line.
And if you go, for example, six lines down to the paragraph that starts 0007, it's -- the line there is:
"It usually takes a very large voltage differential to create a flashover through a good dielectric material."
That's an example of why that would not

10:54:33-10:55:15 Page 74

happen. If -- if the voltage is not high enough, then the insulation will protect the CSST and a flashover will not occur.
So there are many instances where I think this -- this sentence, or the sentence:
"This can often result in an electrical flashover, or arc, between the adjacent systems" would not occur.
Q. All right.
Well, let's break that down, then.
There are circumstances where if you have an energized metallic system in close proximity to even bonded and grounded Gastite you can still have a flashover between the two systems, correct?
A. So my experience is that that would be very unlikely.
Q. Not my question.
My question was is it possible.
A. Yes. Under extreme conditions, it -- it is possible.
Q. And, in fact, you have investigated fires where you had a properly bonded and grounded CSST system where you still had a perforation and an arcing event, correct?

10:55:45-10:56:26 Page 75

A. I want you to refresh my memory on -- on that particular investigation.
Q. Let's talk about the Rushing investigation in Lubbock.
That was yellow-jacket Gastite CSST, correct?
A. Yes.
Q. Installed in the Rushing home?
A. That's correct.
Q. And there was a direct bond to the CSST gas delivery system in the Rushing residence, correct?
A. I've not reviewed the details of the Rushing case. It's been a while, as you know.
I mean, that's -- it's possible. I'm not saying that it's not. I just don't remember that detail.
Q. All right.
Well, if -- you would agree with me that there was an arc perforation in the CSST in the Rushing residence, correct?
A. Yes.
Q. And if it was properly bonded and grounded with a direct bond in compliance with the Titeflex D&I guide, you would agree that would be one of

10:56:51-10:57:33 Page 76

those circumstances where you can still have a perforation even though it is bonded and grounded?
A. Yes.
In specific circumstances where, for example, there is a direct attachment to a house by lightning, it is possible for that to occur.
Q. Well, let's even break that down further.
You would agree with me that if lightning attaches to a home, it's going to -- the current is going to follow basically any path to ground that it can follow, correct?
A. It will follow multiple paths to ground, yes.
Q. Let's -- let's go with that, multiple paths to ground. Okay.
Generally speaking, lightning, or electrical current, will find the path of least resistance in an attempt to get to ground, correct?
A. It will find -- lightning will find all paths of least resistance. It will -- it will go along multiple paths. Some of those paths will have higher resistance than others. And for those paths of higher resistance, the currents will be lower, but it will follow multiple paths.

10:58:04-10:58:37 Page 77

Q. So I want to build a scenario here for you. All right?
Let's say you have a metal flue chimney pipe for a fireplace, okay? Start with that.
A. Okay.
Q. And there is -- that is installed in a chimney chase.
Have you seen that sort of installation in residences before?
A. I'm not sure what you mean by "that." What is "that"?
Q. Well, "that" being a double-wall flue metal pipe installed for a fireplace in a chimney chase.
A. Yes, I have.
Q. All right.
Now, I want you to imagine that a run of CSST is installed within -- in contact with that double-walled metal flue pipe.
Okay?
If the double-walled flue pipe becomes energized from a lightning strike, is it a possibility that it could still arc off to yellow-jacketed CSST under the circumstance that I just gave you?

10:59:10-11:00:04 Page 78

MR. KURTZ: Object to form.
A. So it depends a great deal on exactly, you know, what's connected to what.
But in that particular scenario, the bonding, for example, would help in that scenario -- if the flue pipe were attached directly to the flue pipe -- and perhaps alleviate, or minimize, or prevent the formation of an arc between the flue pipe and CSST. But it is possible for an arc to occur between the flue pipe and the CSST in that scenario, that specific scenario.
Q. Okay. And even if the yellow-jacketed CSST was properly bonded and grounded in that same condition, could you still have an arcing event?
MR. KURTZ: Object to form, incomplete hypothetical.
A. So in the scenario that you've painted, the -- again, the -- exactly how the CSST performs depends on -- on what it is connected to, where it comes from and where it goes to. And -- and in that particular scenario, actually, the bonding of the CSST can minimize and reduce the -- let's say the likelihood of an arcing event. But -- but if the direct lightning event to the house is sufficiently

11:00:47-11:01:33 Page 79

aggressive, it can cause damage, including an arc to the CSST.
Q. Which is ultimately the -- the -- one of the issues in this case, which is the manufacturers are indicating that bonding and grounding makes a yellow-jacketed CSST system safe.
You would agree with me that proper bonding and grounding pursuant to the D&I guide of any of the manufacturers does not render that CSST system safe from all lightning strikes, correct?
MR. KURTZ: Object to form.
A. No, I disagree with that representation.
I believe that for each of the products on the market -- so the WardFlex, the TracPipe and the Titeflex products -- if those are installed in accordance with the manufacturers' instructions, including their bonding requirement, bonding and grounding requirement, these products are safe.
Q. I understand that's your opinion.
A. Yes.
Q. However, I just gave you a scenario where you admitted that if the conditions are correct, even though the yellow-jacketed CSST is still direct bonded pursuant to the D&I guide, you could still

11:01:59-11:02:34 Page 80

have an arcing event.
Where is that information being disseminated to the public?
MR. KURTZ: Objection, misstates testimony.
A. I'm not sure I understand the question.
What do you mean by "where is that information disseminated to the public?" I -- I don't understand the relationship between the first part of your question and the second part of your question.
Q. All right. Well, then we'll break it down.
You've admitted under the hypothetical that I gave you that there are conditions where you could still have an arcing event between a -- a metallic system and yellow-jacketed CSST, even though the yellow-jacketed CSST was direct bonded pursuant to the D&I guide, correct?
MR. KURTZ: Same objection.
A. I mean, I just want to be clear here that -- that I think that we've moved away from the -- the Rushing case, and so -- so I'll make the assumption here that, you know, that -- well, it's not clear to me exactly what the condition is that you're asking me to think about, whether it is the

11:07:22-11:08:05 Page 85

A. That's my understanding.
Q. Okay.
A. Yeah.
Q. All right.
Let's go over to Paragraph 8 of Exhibit 7.
A. Yes.
Q. "Metals are electrically..."
Do you see where I am?
A. I do.
Q. "Metals are electrically conductive materials, making CSST a very good pathway for electrical currents. This leads to the potential for a flashover if the CSST is installed in close proximity to another conductor within a structure and either one becomes energized."
Did I read that correctly?
A. Yes.
Q. So can you conceive of a situation where yellow-jacketed CSST is bonded and grounded with a direct bond pursuant to the installation guide and a nearby metallic system -- pick one, a flue pipe or something of that nature -- becomes energized by a lightning strike, can you still have a flashover, or

11:08:36-11:09:18 Page 86

an arcing event between that metal object and the bonded and grounded CSST?
A. So my experience is that that's very unusual. That -- that the only time that I've seen it is in the context of a direct strike to a house.
Q. All right.
But that -- okay.
So my question, is, though, it can happen where you have an arcing event to yellow-jacketed CSST, even though bonded and grounded, when -- in close proximity to another metallic system that became energized from a lightning strike?
A. So it's extremely rare, and in the -- you know, the -- the over ten years that I've worked in this area, I've hardly ever seen it. So there is a -- sort of a miniscule possibility that that occur, but it's highly unlikely.
Q. Is the answer to my question yes, it can happen?
MR. KURTZ: Objection, asked and answered.
A. I'll repeat my answer.
Highly unlikely.
Q. Let's go down a little bit further.
"It is possible that a flash like..."

11:09:50-11:10:40 Page 87

Do you see where I am? Under Paragraph 8.
A. I do.
Q. "It is possible that a flash like this can cause enough heat generation to melt a hole in the CSST, allowing fuel gas to escape."
Do you agree with that statement?
A. It is highly unlikely if the system is installed in accordance with the guidance for -- for that to ever occur.
Q. It is possible, however, correct?
A. There's a -- there's a miniscule possibility. And, you know, in the over ten years that I've worked in this area, I've hardly ever seen it.
Q. Have you done any testing to quantify your statement regarding how rare it would be?
A. No. And I -- I haven't needed to.
Q. Are you aware of any -- any testing in the industry to quantify the limits of bonding and grounding and its effectiveness?
MR. KURTZ: Object to form.
A. I don't understand the question.
Q. Well, let's go back to the earlier testing. Let's talk about the Gastite, that one specific

11:11:01-11:11:41 Page 88

example where it was -- we had a melt-through at .17 coulombs.
Do you recall that? We can get -- it was Test 15 in Exhibit 5, I believe.
A. Yes, I remember that.
Q. Okay. Are you aware of any testing that has ever put a number of coulombs that bonded CSST is capable of withstanding prior to it melting through due to an arcing event?
MR. KURTZ: Object to form.
A. I don't -- I don't understand what you're asking.
It sounds like you're asking the very things that are, for example, in the Titeflex report that we talked about. So I'm not sure -- I'm confused.
Q. Well, that's what I'm trying to get to.
A. Yeah.
Q. All right.
They hit yellow-jacketed CSST with varying amounts of current.
A. Yes.
Q. They determined that .17 in this one was -- was capable of causing a melt-through.

11:12:04-11:12:59 Page 89

Okay?
A. Yes.
Q. They hit black iron pipe with up to 480 coulombs and they didn't get a melt-through, correct, at least in that testing?
A. In that testing. The testing speaks for itself, yep. Yep.
Q. I'm just trying to get apples to apples.
A. Yeah.
Q. Are you aware of any testing similar to that to test the limits or put a -- a level of coulombs, given a certain waveform, that bonded CSST is capable of withstanding before having an arcing event?
MR. KURTZ: Object to form.
A. So I think you're asking me about, you know, what has been done in the industry to quantify the performance of bonded systems installed in accordance with -- with manufacturers' recommendations. And what's been done on that has been documented through a number of publications, including work that has been done by SEFTIM, as well as Torbin and -- and the GTI report. And that body of work has been a combination of -- of testing

11:13:40-11:28:50 Page 90

and -- and analysis.
And -- and I would also add that -- that the -- I have performed analysis, and my team has performed analysis, to address that question, very specific configurations in the context of this case as I represent in -- in the report where I showed the circuits that we analyzed and the conclusions that we have come to.
MR. SCHUMACHER: All right.
We're going to have a lot more conversation about all of the above, but why don't we go ahead and take a quick break.
THE WITNESS: Good. Thank you.
THE VIDEOGRAPHER: The time is now 11:13, and we're off the record.
(Recess taken)
THE VIDEOGRAPHER: The time is now 11:28, and we're back on the record.
BY MR. SCHUMACHER:
Q. All right.
Dr. Kytomaa, we are back on the record looking at Exhibit Number 7, still back to Paragraph 8.
A. Yes.

11:29:16-11:29:49 Page 91

Q. We had just talked about the sentence:
"It is possible that a flash like this can cause enough heat generation to melt a hole in the CSST, allowing fuel gas to escape."
I'm going to keep reading, though:
"This scenario is worsened by the dielectric jacket that often surrounds CSST. This jacket only" typical -- "typically breaks down in a very small area, creating a pinhole as a result of the flashover. This phenomenon focuses the flash and concentrates heating of the stainless steel inside. The result is a reduced capability of the CSST to resist puncture from flashover compared to un-jacketed pipe."
First of all, did I read all that correctly?
A. You did.
Q. Do you agree that the yellow jacket focuses the flash and concentrates the heating of the -- on the stainless steel?
MR. KURTZ: Object to form.

11:30:19-11:31:26 Page 92

A. Not really.
Q. What testing have you done to validate your opinion?
A. Years ago we performed some testing in which we looked at different waveforms and to learn that if -- if you use a relatively fast waveform, it has a tendency of pressurizing the jacket and sort of causing it to peel away from the -- the metal itself. And in that situation, essentially, the -- the -- the -- the jacket rolls up, literally like you roll up your socks, and away from the -- the location of the -- the arcing.
And so that situation, which is a rapid -- rapid current rise, moves the jacket away and doesn't perform in the way that we just read in -- in this particular patent.
And similarly, if the rate of rise is slow for the current, then in those situations the voltages will be correspondingly lower, and the insulating characteristics of the jacket will reduce the likelihood of an arc forming in the first place, because of the insulating characteristics that we've talked about already before.
MR. SCHUMACHER: All right. Objection,

11:32:04-11:32:31 Page 93

nonresponsive.
Q. I want to go back to Exhibit 3, Page 166.
A. Yes.
Q. 7.1.2, "Claims regarding the yellow jacket."
"In Paragraph 30 of the plaintiffs' second amended complaint, plaintiffs state that the 'insulative yellow'" --
A. I'm sorry. Where are you? I'm sorry. I was a little slow catching up.
Right here?
Q. Right there.
A. Okay. Thank you.
Q. In Paragraph 30?
A. Yep. All right.
Q. I'll just actually skip to the paren:
"... 'insulative yellow jacketing is unnecessary and heightens the danger so much that expert testing has concluded that unjacketed CSST would be better than having the yellow" jack -- "yellow CSST."
Did I read that correctly?
A. Yes.
Q. All right.

11:32:47-11:33:36 Page 94

And your statement is, "This is incorrect"?
A. Yes.
Q. All right.
Would you agree that the patent application is some evidence, or an opinion that would demonstrate that the yellow jacket can create a further issue by focusing the energy from a lightning strike?
A. Yeah. I don't think it's really representative of what happens in the field, but it's -- you know, it's what -- what the patent says.
Q. All right.
And down to Paragraph -- I apologize. Let's go back to Exhibit Number 7, Paragraph 9.
A. Yes.
Q. "Accordingly, it would be desirable to provide corrugated tubing and sealing devices having an increased resistance to physical and electrical forces that approaches that of conventional black iron pipe."
Did I read that correctly?
A. Yes.
Q. Can one -- I'm going to say can you read

11:33:56-11:34:40 Page 95

that to mean that black iron pipe has a better ability to withstand electrical current than CSST?
MR. KURTZ: Object to form.
A. So this talks about:
"... increased resistance to physical and electrical forces that approaches that of conventional black iron pipe."
And I would say that, you know, I think that the -- the context of this patent is very narrow. It doesn't really look at the field application, on the one hand, or doesn't even take into considerations the many downsides associated with black iron pipe that I talk about in my report, and I think we've touched on those already.
And so I -- you know, if your question is do I generally agree with the statement, I think that it's -- it's -- that the patent writers have a -- clearly a very narrow view of -- of these applications; don't take into considerations all sorts of other factors that are important.
MR. SCHUMACHER: All right. Objection, nonresponsive.
I would like to show you what I am marking as Exhibit Number 8.

11:35:05-11:36:18 Page 96

(Document marked as Kytomaa Exhibit 8 for identification)
MR. SCHUMACHER: It's Tab 3, Counsel.
THE WITNESS: Shall I put this one away, 7?
MR. SCHUMACHER: Yes. That would be great.
Q. All right.
Showing you what I've marked as Exhibit Number 8.
A. I'm trying to keep them in order here. I don't know whether that matters or not, but I think that's 4, 5, 7, 8.
There we go.
Q. All right.
Have you seen this series of e-mails before?
A. I may have seen these, but I -- but I don't have a -- certainly not memorized them.
Q. Okay. Well, let's go to the second page, which is Titeflex George 7589.
A. 7589. Yep.
Q. And the Friday, May 18th of 2007 e-mail from John Hibner, who is a code specialist in Indiana.
A. Yes.

11:36:41-11:37:16 Page 97

Q. All right.
I would like to go to the third paragraph.
A. Yes.
Q. "The area under discussion" --
A. Yep.
Q. -- "(and greatly in need of further research) is the combination of an electrical surge created by a lightning strike and CSST."
Do you believe that all research has been completed on the effectiveness of bonding and grounding of yellow-jacketed CSST?
MR. KURTZ: Object to form.
A. I don't know.
I mean, I don't understand the question, first of all, but I -- I mean, I cannot foretell the future as to whether more work will be done in the future.
Q. All right.
Would you agree that the full extent -- or the spectrum, if you will -- of the effectiveness of bonding and grounding has not yet been completely quantified by the CSST industry?
MR. KURTZ: Object to form.

11:37:54-11:38:34 Page 98

A. I think the work that has been done, and the purpose of the work, is clear, and I think that the -- it's a -- in this case, I'm here to provide opinions about a scope that I've already described. And I think that I have all that I need to give those opinions, so that's just me.
And -- and -- and with respect to the industry, itself, I mean, I can't really speak for the industry and what the leaders in the industry intend to do or -- you know, for example, whether they want to develop new patents and those sorts of things, I -- I can't speak to that.
Q. Well, let me ask you it this way:
You would agree with me that the spectrum, if you will, of the effectiveness of bonding and grounding of yellow-jacketed CSST has not yet been fully quantified by the available research as of today?
MR. KURTZ: Object to form, misstates testimony.
A. I think it has. And I think that, not only that, but also the tools to quantify it are well understood, and -- and I think that the -- the -- the opportunities therefore to analyze different

11:39:10-11:39:53 Page 99

kinds of house configurations -- because the details are actually very important. Because the details are important, and the tools are known, the tools are available to look at conditions related to what we think houses will look like today and in the future.
Q. If that spectrum of the effectiveness of bonding and grounding has been quantified, as you have put forth, do you believe or do you -- that the public has a right to know the extent of that spectrum and when the CSST is effective when properly bonded and grounded pursuant to a D&I guide?
MR. KURTZ: Object to form.
A. I -- I believe that the GTI report, for example, is a public document. And so I -- so I don't believe, as your question suggests, for example, that the public does not have access to the information that is available that I believe is quite complete.
Q. You're aware that the manufacturers engaged in a national yellow safety campaign, correct?
MR. KURTZ: Object to form.
A. I'm not sure exactly what you mean.

11:40:23-11:41:12 Page 100

Q. Well, were you aware the manufacturers of CSST -- Gastite, or Titeflex, Omega Flex and Ward Manufacturing -- all engaged in a national safety campaign -- campaign touting the effectiveness of bonding and grounding of yellow-jacketed CSST?
MR. KURTZ: Same objection.
A. I don't -- I mean, that may be the case. I don't specifically know, and that's certainly not been the focus on my investigation.
Q. If yellow-jacketed CSST -- well, strike that. I'll ask you a different way.
Do you believe that unbonded yellow-jacketed CSST is a safe product?
MR. KURTZ: Object to form.
A. In certain very specific circumstances, a -- I would say the product manufactured by, for example, Gastite may be installed in a manner where -- where it's not bonded and it's perfectly safe.
So that -- that situation can occur.
Q. For an extremely low amount of current?
A. I don't understand your question.
Q. Okay. I'll ask it a different way, then.
You've seen the testing that Gastite was --

11:41:34-11:42:46 Page 101

had a melt-through at .17 coulombs in the testing from LTI, correct? You've seen that testing?

A. We've talked about that document, yes. That's correct.

Q. Okay. Can you even quantify for me the amount of current, the amount of coulombs that bonded Gastite CSST can withstand without having a melt-through?

A. So that's a very different question from what you had asked me before, but I believe that tests have been performed to quantify, by pre-pricking the jacket, what -- what sorts of electrical insult in the form of current CSST, specifically Gastite CSST, can take and not create a perforation, or under what current conditions a perforation is formed.

And that work has already been done -- I'm sorry, also been done for other manufacturers, as I understand it, including Omega Flex.

Q. By whom?

A. I believe that some of the testing has been carried out by LTI.

Q. In what context? For submission with the GTI report or for individual manufacturers?

11:43:32-11:44:22 Page 102

I'm just trying to figure out what test you are referring to.

A. For example, Exhibit 6.

Q. Okay. I'm going to jump to some code standards, so I just want to give you that heads up. All right?

ANSI LC 1, are you familiar with that?

A. Yes.

Q. Okay. Originally ANSI LC 1 did not require any sort of lightning testing; is that correct?

A. That may be true. I have not looked at the chronology --

Q. That's okay.

A. -- of LC 1.

Q. Well, ANSI LC 1 today, as of 2019, requires CSST to be able to withstand 4.5 coulombs, correct?

A. That -- that may be.

Q. Okay. So there's testing that can be done to demonstrate that yellow-jacketed CSST -- well, that's actually a bad -- yellow-jacketed CSST unbonded cannot withstand 4.5 coulombs, correct?

A. Under certain circumstances, it can, actually.

Q. Which product can withstand that much?

11:44:54-11:45:27 Page 103

A. So did -- the -- the best way I can answer that actually is that -- to say that, under rapid waveforms consistent with lightning, the -- it is much more difficult to form a perforation in a CSST. And in those with very rapid waveforms, you can -- you can have much higher coulombs without a perforation.

Q. All right.

A. And so that is -- that would be true to different degrees, because the products are different for the different manufacturers of the yellow product.

Q. All right.

Well, let's use a 10 x 350 waveform, which you would submit is a standardized waveform, correct?

A. That's a -- a waveform that is commonly used for partial, or indirect --

Q. Okay.

A. -- indirect insults on houses.

Q. Would you expect yellow-jacketed CSST to be able to withstand 4.5 coulombs with -- using a 10 x 350 waveform?

MR. KURTZ: Object to form.

11:46:07-11:46:52 Page 104

A. If a -- a section of CSST is used in that very, very specific protocol not in the house, the -- the -- and -- and 10 x 350 waveform is imposed to the levels, or a sufficiently high peak current to deliver 4.5 coulombs, I think the data shows that -- that the odds are that -- although there is some variability in testing, the odds are that there may be a perforation.

Q. All right.

I don't know that you can answer this question, but I'm going to ask it anyways.

Let's assume a 10 x 350 waveform. Let's assume yellow-jacketed CSST, bonded and grounded.

How many coulombs can it withstand?

A. So the difficulty associated with your question is that ultimately you have to go to the specifics of the house in question. And -- and -- and so if the -- as you say, if the CSST is bonded, one has to do the analysis of the -- you know, the bonded circuit, just as I do in the report for -- for two -- two homes. And -- and what you see is that when you deliver, you know, in many instances much more than 4.5 coulombs, you may still not have any damage to the -- to the CSST and no arc

11:47:27-11:48:08 Page 105

formation.
Q. But the representations by the CSST manufacturers is that bonded and grounded yellow-jacketed CSST is a safe product, correct?
MR. KURTZ: Object to form.
A. The -- so what I believe -- so two things:
One is that, you know, exactly what the representations are by the industry I think speak for themselves. I believe that -- that a properly-installed yellow-jacketed product for each of the -- the three manufacturers in this matter is safe if installed in accordance with their instructions, and according to code.
Q. But the information that there are situations where bonding and grounding will not be effective is not being disseminated to the public.
Do you agree with that?
A. No, I don't agree with that at all.
I think that the GTI report is actually very clear in -- in talking about essentially all of the situations that are relevant to homes.
Q. And the GTI report warns consumers that there are circumstances where the bonding and grounding in their home, of the CSST in their home,

11:48:32-11:49:29 Page 106

will not be effective?
MR. CASPER: Object to the form of the question.
A. I'm not -- I'm not sure what you're referring to. I'll be happy to review that particular section of the report.
Q. All right.
Let's get back to Exhibit 8.
And that second page -- all right. Let's go again down to that May 18th of 2007 John Hibner e-mail.
A. Yes.
Q. Back to the same paragraph.
"Obviously, a lot of damage can be done as lightning speeds through a house to ground. But no other system seems to be as vulnerable as the CSST which becomes a" -- quote, unquote -- "'flame thrower' when lightning creates a pinhole from arcing from the CSST to other metal."
Did I read that correctly?
A. You did.
Q. You agree that since CSST is transmitting gas, which is a flammable item, through a house,

11:49:58-11:51:01 Page 107

that great care should be given to put the best, safest products out on the market?
A. Yeah. I do believe that -- that care should be given when products are put out on the market.
Q. Do you believe that consumers should be warned of all potential issues or problems with products?
MR. KURTZ: Object to form.
A. So product manufacturers have -- have certainly an obligation to minimize the risk associated with their products in light of the benefits that the products provide. They have an obligation to design, certainly, those risks that -- that are significant, either by designing them -- the risks out of the product, preventing -- protective means, barriers, and other different kinds of protective means that one can -- can come up for consumer products. Or, in those situations where neither designing the product -- the risk out or the -- the provision of protections are available, the -- the product manufacturer should, and regularly do, provide warnings associated with what those risks are.

11:51:40-11:52:32 Page 108

Q. Are you aware of any warnings issued by the CSST manufacturers with regard to -- that reach consumers with regard to the effectiveness of bonding and grounding?
A. The -- well, first of all, the -- really the documentation associated with, for example -- and probably other things as well -- the GTI report is available to consumers. And then the --
Q. If they go and find it?
A. If -- that's right. If they -- if they look for it, it's available to them. It's in the public domain.
Also, the -- the product is typically installed -- installed by professionals who, you know, have training in -- in the installation of these products, and they're the agents of the owners in -- in performing that function. And they're the ones who not only have the training but also are provided with the documentation associated with each of the distinct products from WardFlex, Titeflex, and -- and Omega Flex, both in the form of documentation, D&I guides, as well as warnings.
Q. Does the -- the code -- local code person -- I'm going to call him the "AHJ," the

11:57:59-11:58:57 Page 113

That is not my definition of "design," so I would differ on that.
Q. Well, then can you answer my question first?
A. I'll try to answer your question.
So the -- the object themselves may -- may have evolved and changed. The -- all manufacturers would -- certainly it's true of CSST manufacturers -- develop over time. Oftentimes they will change suppliers for different parts of their products. They may -- they may make improvements to the manufacturing processes. And I'm sure Ward, Gastite, Omega Flex do -- do this. And so, as a result, the -- I would completely expect that the products would change over time.
You know, whether it is because of slight changes to the design that make the -- the process more efficient or improvements to the -- the product, those sort of things.
Q. Those are great generalities, but I'm going to ask you the very specific question:
Are you aware of any changes between the 2000 piece of TracPipe and the 2011 piece of TracPipe?

11:59:28-12:00:14 Page 114

A. So I don't specifically know, but I would expect that -- that the jacket material may -- may change over time. I have not analyzed that.
But -- but -- but this goes to a point I just made a moment ago where -- where you -- you're looking carefully at your suppliers and making sure that -- that, you know, you're getting the product that you want from your suppliers. And you may be changing suppliers and resulting in -- in certain changes to the composition that may still meet the intended specification for the jacket.
And likewise, the, you know, metallurgical specifications, the -- the suppliers of the metal and the specific composition of the metal that is provided, as long as it is within the specification that is -- that is intended is something that manufacturers -- manufacturers will continually review, and therefore the products may change over time in the market.
MR. SCHUMACHER: Objection, nonresponsive after, "I don't specifically know."
Q. All right.
For Titeflex, the same basic question. Are you aware of any specific changes between a piece of

12:00:39-12:01:21 Page 115

Gastite in 2000 and 2015 when they stopped selling it in the US market?
MR. CASPER: Object to the form.
A. So I don't -- I haven't reviewed exactly the years that they started to -- to deliver the product to the market, but I would expect the same to be true for Titeflex as Omega Flex where they would be looking at the material formulations and specifications and -- and suppliers and -- and, over time, changing these. And I would expect that that would be reflected, then, in -- in the products being a little bit different from the beginning of the time frame that you've stated to the end of it, if those are correct.
Q. All right.
Do you know when Ward Manufacturing stopped selling -- if they've stopped selling their yellow WardFlex product?
A. I don't know, either.
MR. SCHUMACHER: All right.
I'm showing you now what I have marked as Exhibit Number 9.
(Document marked as Kytomaa Exhibit 9 for identification)

12:02:08-12:02:47 Page 116

THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. I'm assuming you've seen this e-mail at one point or another, e-mail exchange between Mark Goodson and Robert Torbin.
A. I may have, but I've certainly not committed this to memory.
Q. I'm shocked, Harri. All right.
Exhibit Number 9 -- granted, this is August 27th of 2004 --
First of all, who is Bob Torbin?
A. He at the time was working for Foster-Miller.
Q. He's an engineer, correct?
A. That's my understanding, yes.
Q. All right.
And I'm going to use this term -- he's been called this before -- is Bob Torbin kind of known as the "godfather of CSST"?
MR. CASPER: Object to form.
A. Yeah. I don't know. I don't know. I actually don't have an opinion one way or another on that.
Q. Okay. Well, you would agree with me that

12:13:15-12:14:11 Page 125

the lightning strike sort of, as -- as I described already, will find multiple paths to ground, and -- and a part of the total energy associated with that discharge now impacts the home. And so that can be something that is either induced by -- by inductive phenomena, inductive electric phenomena associated with a lightning discharge that induces voltages in the home, or a point of attachment that is sufficiently remote so that only a part of that total energy impacts the home.

Q. So what is the charge transfer onto a bonded yellow-jacketed CSST system in a direct strike?

MR. KURTZ: Object to form, incomplete hypothetical.

A. So in -- in the situation that you've sort of constructed there, the -- the -- that situation will be a situation where the full energy of a return stroke is injected into the -- the fuel gas system.

Q. Well, on the fuel gas system, on any other metallic system in the house, correct? The -- the stroke would find any path to ground in a home it could, would it not?

12:14:35-12:15:16 Page 126

A. I don't understand that question.

Q. Well, the entire charge from a direct strike is not only going to go onto the CSST; it's going to be spread amongst any other metallic path, or any other path to ground, correct?

A. I think generally the lightning discharge will find multiple paths to ground. That's correct.

Q. So I was really asking a wide-open question --

A. Yeah.

Q. -- which was, when I said what is the charge transfer onto the CSST from a direct strike, the answer is you don't know, because it depends; there's many variables, correct?

A. Well, I do know that it cannot exceed the total charge associated with the return stroke, so I think that I don't know -- I mean, of course there are many parameters. Each situation is unique. There's no question about that. And each situation, the charge difference -- the charge distribution and what the destination and what each multiple -- each of the multiple paths is is different. There's no question.

And so, you know, you've asked me a

12:15:41-12:16:24 Page 127

question where you don't offer me that information, and so, of course, there are many different situations. I've tried to answer the question as best I understood it. But you're right. There are multiple paths to ground, and there are many different configurations, and each configuration is different.

Q. And each lightning stroke is a little different, different waveform, different voltage, correct?

A. I think that the -- the lightning, the lightning waveforms and voltages tend to be well characterized with respect to what the range of likelihoods are for, let's say, different peak currents, or whether -- what the rise and fall time are for first negative discharge, for example, or subsequent negative discharge. So I think that there's a good understanding of those things.

Q. That's the point I'm trying to get to: There are many variables out there. However, there is one representation by the CSST manufacturers, and that is, "Bonding and grounding of yellow-jacketed CSST makes it a safe product." That is not true under all lightning

12:16:43-12:17:25 Page 128

conditions, correct?

MR. KURTZ: Object to form, misstates evidence.

A. I don't -- I don't think that's correct. I mean, I think that in performing the analyses that Torbin and SEFTIM and -- and GTI have carried out, they've taken into consideration the breadth of possibilities and specifically looked at different types of -- of events that occur out there to then -- and lightning events that can impact homes. And so I don't think it's a fair representation to say that there's only one representation from the industry, and there are many variables that they somehow have not taken into consideration. I think that -- I think that they have.

Q. Has that information been disseminated to the public, though, those disclaimers, if you will, of the conditions under which bonding and grounding will not effectively protect the CSST system?

MR. KURTZ: Object to form and foundation.

A. Well, I -- I didn't -- I don't know what you mean by "disclaimer" specifically. I didn't

12:17:58-12:18:51 Page 129

talk about disclaimers.
But the information certainly is available in the public through the GTI report, through documentation associated with, for example, Fuel Gas Code, NFPA 54 deliberations. Those are open to the public. As well as the GTI report.
I may -- may be repeating myself.
So the -- so all of that information is in the public domain. And the way that the public can access that information in a manner that it is digestible, if you will, is as one does when one needs any work done by a professional.
So, you know, I'm having work done on plumbing at home. I hire a plumber, and -- and I expect the plumber to be a responsible plumber who understands code regulations, as well as what the expectations of the authority having jurisdiction, so that he or she can relay that information to me, if necessary.
MR. SCHUMACHER: Objection, nonresponsive.
I'll tell you what. Let's go ahead and take a break.
THE WITNESS: Thank you.
THE VIDEOGRAPHER: The time is now 12:18,

Page 130

and we're off the record.
(Luncheon recess taken at 12:18 p.m. to 12:59 p.m.)

12:59:24-13:00:38 Page 131

AFTERNOON SESSION
THE VIDEOGRAPHER: The time is now 12:59, and we're back on the record.
BY MR. SCHUMACHER:
Q. All right.
I think we can move Number 9 off to the side.
A. The pile.
MR. SCHUMACHER: I'm going to show you what I've marked as Exhibit Number 10.
(Document marked as Kytomaa Exhibit 10 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. Have you seen that report before, that article before?
A. This document is not dated, so I'm not sure -- so I -- I may have seen this document, but I'm not sure it's the exact one that I've seen.
Q. All right.
Well, let me just ask you, in general terms -- because I'm not going to go into detail on this -- you've generally seen this article before, though? This is regarding ignition testing done by

13:00:58-13:01:44 Page 132

Integrity Forensics.
A. So I have seen work from them. And it may be this document, but I'm not sure.
Q. Okay.
A. Yeah.
Q. We can clarify this one very quickly as far -- I know in other matters you have provided testimony about testing you've done about the ability of fugitive gas escaping from a arced hole to ignite.
In this matter, however, you have not formed any opinions or intend to provide any opinions regarding the ability of gas to ignite when escaping from a arced hole in CSST?
A. So I've not provided specific opinions on this, but if there are representations that are made by the plaintiffs, that have not yet been made on this subject, I may then respond to those representations.
Q. All right.
The only question I'm going to ask is this: There are circumstances under which fugitive gas escaping from an arced hole in CSST can ignite and sustain ignition, correct?

13:02:14-13:03:21 Page 133

MR. KURTZ: Object to form.
A. So in the -- the -- in those situations -- like, for example, situations where the CSST was improperly installed, and a house now is impacted by lightning that then causes a perforation. In instances like this, which I have -- I have seen, what often happens is that a fire is started. So a fire is either started elsewhere by the lightning event and then, over time, the -- well, fire started elsewhere; the gas coming out of the small perforation that is created does not ignite initially, and then ultimately the fire spreads and the gas is ignited and does -- does burn.
So -- so that is one manifestation that I think is a fairly common one, because the likelihood of the gas igniting in the event of -- of an electrical insult on the -- on the CSST is very low. Is very low.
Q. Okay.
A. And I've performed testing that specifically shows this.
There are -- and so if there is any significant separation between -- between the CSST and -- and the -- the other metallic object, then

13:03:50-13:04:42 Page 134

it's very difficult for the gas to ignite. And all of the testing that I've done like that actually has resulted in no ignition.
There are circumstances where, if you place the -- the electrode, the opposing metal object right in contact with the CSST, and now in the same situation, a situation where the CSST is improperly installed, is not bonded, and now there is a -- a direct, or indirect, event that causes an arc to form between a metal object that is in contact with the CSST, there is a -- rare occasions in which -- in which it is possible for the -- for the gas to ignite.
But -- but none of the tests that I've done have been able to duplicate that.
MR. SCHUMACHER: All right. Objection, nonresponsive.
Q. Are you aware of testing, like what has been done here by Integrity, that does seem to demonstrate that once there's an ignition -- the initiation of an arc hole, the fugitive gas can ignite?
Are you aware of at least testing by others that has demonstrated that that scenario does exist?

13:05:08-13:06:26 Page 135

A. So I'm aware of the work that's been done by Spruiell, Hergenrether and Colwell of Integrity Forensics out of -- I think they're out of Sanger, Texas.
Q. Yes.
A. I'm aware of the work that they have done, and I would be happy to -- to discuss that in, you know, more specifically if that's what is something that you wish to do.
MR. SCHUMACHER: No.
Moving on, I'll show you now what I have marked as Exhibit Number 11.
(Document marked as Kytomaa Exhibit 11 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. Have you seen that document before?
A. It's a poor copy of -- of a document that is entitled Omega Flex CounterStrike.
And, I mean, I have not seen this exact copy. I have not seen anything as poor as this. But I've seen -- I believe I've seen a -- a copy of this elsewhere.
Q. This one is actually dated -- the last

13:07:24-13:08:02 Page 136

page, it says revised as of June of 2004, and I would like you to turn to the fifth page.
A. Yes.
Q. There is a chart at the bottom. On the vertical axis it says "energy measured in coulomb level."
Do you see that?
A. I do.
Q. All right.
I would submit to you this is actually an advertisement for CounterStrike I, the first generation of CounterStrike.
Have you -- are you aware of the two different models, CounterStrike I and then CounterStrike II?
A. I'm -- I'm aware that there was more than one incarnation of CounterStrike.
Q. Okay. On the right-hand side, where it says "CounterStrike .010 wall," it has a coulomb of 0.99.
Do you see that?
A. In the far right?
Q. Far right, yes.
A. In the -- yes. I mean, there's a -- what

13:08:25-13:09:21 Page 137

looks like a sort of a graphical representation at the bottom of the page with, on the far right, saying -- it says "ratio." So just next to that is, I think, where you're looking.
Q. Yes.
So the column just to the left of that, says "TracPipe," 0.10 (sic) "wall," and coulomb of 0.12.
Do you see that?
A. I do.
Q. All right.
This is essentially an advertisement indicating that CounterStrike can withstand .99 coulombs as opposed to TracPipe, which can withstand .12 coulombs, representing a 725 percent increase.
MR. KURTZ: Object to form.
Q. Do you see that? Or do you agree with my representation?
A. Yes. I mean, that's what the document says.
Q. All right.
Do you know whether or not the 0.12 coulomb for TracPipe, if that represented a bonded or

13:10:07-13:11:10 Page 138

unbonded piece of TracPipe?
A. I -- I don't think that's a question I know how to answer.
Q. Okay. What more information would you need to answer that question?
A. I think the concepts you're presenting to me are what I think is a -- is represented as -- as -- and I'll quote from this document. And I'm just reading what the document says:
"The electrical energy levels in coulombs ... which were known to cause failures were then used as a baseline..."
So I believe that the horizontal numbers there, at the bottom, are electrical energy levels in coulombs known to cause failures.
Q. Okay.
A. And so if you do a test of what is the -- what I call the coulomb withstand of a specific manufacturer's product, the concept of whether it's installed properly in a house is like -- it's like apples and oranges. It's, like, totally unrelated to what you're talking about, so I don't -- I don't know how to answer that question.
Q. All right.

13:11:30-13:12:07 Page 139

Well, next to it, just to the left of TracPipe, it says "competitive CSST brand"?
A. Yes.
Q. 0.10 (sic) wall.
A. Yes.
Q. That also is 0.12?
A. That's what that says, yes.
Q. That's what that says.
Do you have any idea which manufacturer of CSST that was?
A. I -- I do not know. It may be that they're using their own number. I don't -- I have no idea.
Q. All right.
Well, I think it's trying to draw a comparison here between various products.
The last one, on the left-hand side, "competitive CSST brand, .008 wall," and that has a coulomb level of 0.015.
Do you see that as well?
A. Yes, I see that.
Q. All right.
Do you know whose CSST that is?
A. I don't know whether the -- what the foundation of that is, whose product it is, or

13:12:28-13:13:57 Page 140

whether it's an accurate representation.
Q. Okay. But this is an advertisement from Omega Flex, correct?
MR. KURTZ: Objection to form.
A. Yes, this is an advertisement from Omega Flex, specifically for -- advertising the CounterStrike product.
MR. SCHUMACHER: I'll show you now what I have marked as Exhibit Number 12.
(Document marked as Kytomaa Exhibit 12 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. All right.
Do you recognize this document? Or have you seen this document before?
A. Yes. I -- I'm -- I believe I have seen this document.
Q. All right.
And so this is a similar document to Exhibit Number 11. This is now just updated for CounterStrike II.
Do you agree with that?
MR. KURTZ: Object to form.

13:19:53-13:20:35 Page 145

determinations as of -- or determinations of whether the bonding is effective in certain circumstances, and how much electrical charge needs to be imparted to the whole system before the CSST itself might become perforated.

And so, you know, that's the nature of the analyses that I've done. So the tools exist for that analysis. I have not seen a specific analysis that compares a specific house on the one hand with TracPipe and on the other with CounterStrike.

Q. All right.

Let's go one bullet above that, the third bullet.

"Testing by a leading US lightning laboratory; resistance to damage from transient electrical arcing caused by lightning exceeds performance of conventional TracPipe CSST by 5,000 percent."

Would you agree with me, then, CounterStrike is a safer product than TracPipe?

MR. KURTZ: Object to form.

A. So I do not agree with that. I mean, I think that that particular statement right there

13:21:05-13:21:51 Page 146

focuses on a very narrow point and takes out of context, specifically out of the context of a household gas system, or distribution system, and makes a point associated with essentially this resistance to damage point. And the -- if you were to perform a more thorough comparison, you should take into consideration the fact that TracPipe, the yellow-jacketed Omega Flex product, has an insulating jacket, and that the likelihood of actually forming an arc that overcomes the dielectric strength of the jacket itself is much less likely because it is an insulated product -- as opposed to CounterStrike not being insulated -- and furthermore, there is another level of protection associated with TracPipe that CounterStrike does not have, and that is the requirement for it to be bonded.

And so if you take all of these things into consideration, you're really looking at a different product that is safe if installed in accordance with the manufacturer's instructions.

And the same would be true for this different product, called CounterStrike, that is also safe if installed in accordance with the

13:22:15-13:22:59 Page 147

manufacturer's instructions.

Q. This is an advertisement from Omega Flex, correct?

A. This is actually an advertisement specifically for CounterStrike.

Q. For CounterStrike. Okay.

A. Yes.

Q. What's the first two words at the top -- the top left?

A. "Increase Safety - Reduce Cost."

Q. All right.

So in the earlier document we looked at -- I can find for the exhibit number -- we had CounterStrike I at one coulomb. Then we have another advertisement, CounterStrike with -- able to withstand six coulombs.

Is there any advertisement that Omega Flex could put forward, or any of the CSST manufacturers, to say "yellow-jacketed bonded and grounded CSST, capable of withstanding" X "number of coulombs"?

MR. KURTZ: Object to form.

A. If I understand your question correctly, you're asking me is there some kind of advertisement that one -- that Omega Flex could put out about

13:23:36-13:24:28 Page 148

TracPipe, for example, regarding -- regarding what the coulomb withstand is associated with the TracPipe -- pipe yellow product?

And the answer to that question is yes. In -- so the way to address something like this would be to show a specific house configuration and to show that bonding quantitatively is very effective, as has been demonstrated by -- by Torbin and Kraft, as well as the GTI report, as well as SEFTIM, that -- that shows that -- that with a significant -- let's say with a lightning discharge to the point of entry of the gas, the -- the bonding redirects a lot of that energy in such a way as to prevent, in many instances, the formation of an arc on the yellow product.

So that is -- that is -- those are the benefits associated with the yellow product that I think the industry does represent through the very documents that I've just mentioned to you.

MR. SCHUMACHER: Objection, nonresponsive.

Q. But all TracPipe, according to their advertisement, was -- was capable of being damaged at .12 coulombs. All CSS -- CounterStrike II is susceptible at six coulombs. All yellow-jacketed

13:25:02-13:25:34 Page 149

CSST bonded and grounded is capable of withstanding a specific number of coulombs.
Does such a number exist?
MR. KURTZ: Object to form. Asked and answered.
A. I think in a specific house geometry, yes.
Q. But not across the board for every single house?
MR. KURTZ: Same objection.
A. Every house is different, and so you would have to perform the analysis and arrive at that number for each house configuration. And you can do that if you -- if you so choose.
Q. But you've come up with an opinion that says that yellow-jacketed CSST is always safe when properly bonded and grounded.
That's simply not true, is it?
MR. KURTZ: Object to form.
A. I -- I think it is. I mean, I think that the yellow product is safe. Specifically, for example, the Gastite yellow product is safe is -- if installed in accordance with the manufacturer's recommendations.
Q. In every circumstance? Every lightning

13:26:14-13:27:12 Page 150

strike?
A. Yes. I think it's -- it is safe. And as long as it is -- it is installed in accordance with manufacturers' recommendations.
Q. But you testified earlier that you've seen situations where CSST, yellow CSST was properly bonded and grounded and was still perforated by a lightning strike.
MR. KURTZ: Object to form.
Q. Correct?
A. So my testimony earlier was that there is -- there are circumstances that have a miniscule probability and are incredibly rare in which a house may be directly struck by lightning, and if the CSST is not bonded, it may be possible for the CSST to be perforated by the lightning insult.
MR. SCHUMACHER: I'm showing you now what I have marked as Exhibit Number 14.
(Document marked as Kytomaa Exhibit 14 for identification)
THE WITNESS: Thank you.
MR. SCHUMACHER: It's actually 15 in your book.
Q. All right.

13:27:43-13:31:43 Page 151

I would like you to turn to the third page of Exhibit 14.
A. Third page. Yep.
Q. Specifically Paragraph 0004.
MR. KURTZ: Oh, geez.
THE WITNESS: What are you doing?
MR. KURTZ: Let's go off the record.
THE REPORTER: Off the record.
THE VIDEOGRAPHER: The time is now 1:27, and we're off the record.
(Recess taken)
THE VIDEOGRAPHER: The time is now 1:31, and we're back on the record.
BY MR. SCHUMACHER:
Q. All right.
Doctor, I've put before you Exhibit Number 14. This is another US Patent and Trademark Office application. This one is to Omega Flex.
Are you familiar with this document?
A. Yes, I think I've seen this document before.
Q. All right.
I would like to go to the third page, Paragraph 0004.

13:32:01-13:32:39 Page 152

A. Yeah.
Q. "Another drawback to existing tubing is that the tubing is often contained within a jacket. Typically, the jacket is made from an insulative material. In the event that the piping is introduced to an electrical charge (e.g. from direct or indirect lightning), charge accumulates on the jacket and can burn through the jacket to the tubing resulting in a breach of the tubing."
First, did I read that correctly?
A. You did.
Q. How is that statement any different than what is contained in the Gastite Flashshield patent application with regard to the effects of the insulative material?
A. I mean, clearly this is a different document, different statement.
Let me take just a couple of minutes, if I may, to read this section that you're quoting from.
So this description really refers to tubing that is a braided tubing. It talks about, if you look at 0003, second line:

13:33:17-13:33:56 Page 153

"The braid is fixed at opposite ends of the corrugated tubing. The braid reinforces the corrugated tube structure thereby resisting the expansion of corrugations when the internal pressure is increased. The braid is effective in the function of resisting the expansion of the corrugated tubing, thereby increasing operational pressure capability. However, the braid covering the corrugated tubing outer diameter is subject to relative motion with the corrugated tubing that it covers. The tubing and the braid move relative to each other along the length of the corrugated tubing. In applications that plumb the corrugated tubing to mechanical equipment that create vibration translated to the tubing, the relative" motions "causes" -- sorry -- "the relative motion causes abrasion between the inside of the braid and the outer surface of the tubing. The abrasion between the tubing outer surface and the braid inner surface creates failure mechanisms that compromise

13:34:19-13:35:02 Page 154

the integrity of the corrugated tubing structure. The braid saws and rubs off the outer surface material of the corrugated tubing until the tubing pressure boundary fails and subsequently leaks the working fluid."

So I think -- I think that this document relates to a different kind of tubing that has a braid.

Q. That's nice, except Paragraph 4 is dealing with the jacket and the jacket being of an insulative material and that it accumulates the charge. That has nothing to do with the -- the braiding, as you've pointed out. But the document will speak for itself on that issue.

*My question is, is do -- do you foresee that, or do you have an opinion as to whether or not the yellow jacket actually helps to accumulate the charge and focus it onto a point, which can result in perforation of the CSST?

THE VIDEOGRAPHER: The time is now 1:34 and we're off the record.

(Discussion off the record)

THE VIDEOGRAPHER: The time is now 1:37,

13:38:11-13:39:02 Page 155

and we're back on the record.

*(Record read)

MR. KURTZ: Object to form.

A. I've already answered this question, actually. You've asked me whether the -- the insulation of -- I think you asked me about the Gastite, and I assumed that you're asking me about the Omega Flex yellow product now --

Q. Yes.

A. -- focuses the energy, and I -- and my opinion about that is that there are instances -- there are many instances where I expect that not to be the case, and those are situations where the rate of rise of the current associated with the lightning insult to the tube is -- is such that it causes pressure to build up in the insulation and to separate the insulation from the corrugated steel part of the CSST, and then ultimately to -- to be blown away.

And in that situation, the -- the -- the insulating jacket does not focus the energy. And in that -- in that situation, the -- it is also true that the amount of charge acquired to breach the CSST is -- is not lower, but higher than -- than --

13:39:36-13:40:27 Page 156

than you would expect.

Q. What if there's a breach in the yellow jacket from installation or some other purpose? Does that then cause the energy to be focused at that breach of the yellow jacket for the Omega Flex TracPipe product?

A. As I -- first of all, the -- the vast majority of CSST that is installed in -- in homes is not breached, and -- and there are circumstances in which -- so if the rate of rise of the current is now lower than the example that I just provided, then the insulation of the -- of the jacket actually can prevent the formation of an arc in the first place. And so -- so in those two examples, I've given you examples that I think -- I know are representative of things that can occur in the field where -- where focusing -- focusing does not occur.

The -- in the event that the -- in the unlikely event that you have an alignment of both a -- this hypothetical perforation in the insulation and a -- an opposing metal electrode that becomes now energized such that there is a potential difference between the opposing metal electrode and the CSST, then, in those situations, the -- the

13:41:02-13:41:40 Page 157

voltage that is required to form an arc is lower, because you no longer have the -- in this hypothetical situation, the insulating characteristics of the jacket, since the jacket has been perforated in the hypothetical. And so an arc can form at lower -- lower voltages.

But generally that would not be representative of what would happen in the field.

MR. SCHUMACHER: Objection, nonresponsive.

Q. But let's go back, if we need to, to Exhibit Number 6, the LTI report and statement from Omega Flex that:

"Based on field failures reviewed by Omega Flex..."

So Omega Flex was seeing it in the field. It's not hypothetical, having breaches in the -- in the yellow jacket.

MR. KURTZ: Object to form.

Q. I would be happy to show it to you again.

A. Yeah. Exhibit 6?

Q. Exhibit 6 --

A. This is --

Q. -- EXPONENT 10625.

It's actually -- for you it would be 47.

13:42:13-13:42:41 Page 158

A. Got it. 10625?

Q. Yes.

A. If you could point me to the --

Q. The second line of the last paragraph.

A. Okay.

Q. Go ahead and read that for the jury.

A. Yes.

So that paragraph starts -- I'll start at the top of the paragraph, the last paragraph:

"The simulated lightning testing included preparing the sample by breaching the jacket only. Based on the field failures reviewed by Omega Flex, the jacket can easily and is usually breached during installation, although for testing the breach was required to assist in the discharge."

Q. All right. That's sufficient.

So it's not just merely a hypothetical situation. This is happening in the field, where Omega Flex is telling LTI that the jacket can easily and usually is breached during installation.

MR. KURTZ: Object to form.

A. Sorry.

13:43:04-13:44:02 Page 159

No. I think it is a hypothetical, because -- the reason why it's a hypothetical is that it can happen, but it doesn't always happen, first of all. And secondly, that the breach must align now with an opposing metal object. And if you -- if they don't align, then the breach is actually not -- no longer effective at assisting in the discharge, as it says in Line 4 of the last paragraph of 10625.

So that's why I think it's a hypothetical.

MR. SCHUMACHER: All right.

Let's go to what I've now marked as Exhibit Number 15.

(Document marked as Kytomaa Exhibit 15 for identification)

THE WITNESS: Shall I put 14 away?

MR. SCHUMACHER: You may.

THE WITNESS: The pile. The pile grows. Thank you.

BY MR. SCHUMACHER:

Q. All right.

Exhibit Number 15, this is an advertisement by Gastite, Titeflex Corporation, about CounterStrike.

13:44:34-13:45:13 Page 160

Do you agree with that?

A. Yes.

So this is a document by Gastite talking about CounterStrike, yes.

Q. All right.

I would like you to go down to the third paragraph, "The Rest of the Story."

Do you see that?

A. I do.

Q. "Studies have shown that more than 50 percent of lightning flashes have charge levels in excess of six coulombs."

Did I read that correctly?

A. Yes.

Q. So if CounterStrike is rated, from their own advertisements, up to six coulombs before it would perforate, and 50 percent of lightning flashes are in excess of six coulombs, it would be fair to say that the CounterStrike product would only be safe for half of the -- of lightning flashes?

A. I don't think your statistics are correct.

Q. Where am I wrong?

A. I -- I think your representation of half of the lightning strikes being greater than six

13:45:32-13:46:25 Page 161

coulombs --
Q. Well, let me ask you this:
A. -- is not correct.
Q. Do you agree with that statement that:
"Studies have shown that more than 50 percent of lightning flashes have charge levels in excess of six coulombs"?
A. I don't think that's correct, based on my review of the scientific data.
Q. All right. Then we move on.
A. Actually, sorry. Let me -- let me -- let me clarify what I mean.
The -- here there's a confusion that is introduced by -- by this document between "flashes" of lightning, which is the sum of all of the current -- the charges associated with return strokes, and return strokes. And when Omega Flex makes representations of six coulombs, they specifically mean a return stroke, not multiple return strokes that constitute a flash. Okay?
And so that's -- I think that this document certainly is misleading in that way.
Q. Okay. Well -- so if you have multiple flashes in a brief time, is there a cumulative

13:46:47-13:48:17 Page 162

effect of the charge transfer?
A. Typically not.
Q. Can there be?
A. Not that I've seen.
MR. SCHUMACHER: All right.
I'll show you what I've marked as Exhibit Number 16.
(Document marked as Kytomaa Exhibit 16 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. I'll ask you to turn to the second page.
And this is an e-mail Friday, November 9th of 2012, from a Mike Peters at Morrison Supply.
I'm just trying to get an understanding of what was -- what information was available in the industry. Second page.
A. I think you misrepresented the -- who's sending and who's receiving.
Q. Did I?
A. Yeah.
Q. I apologize if I did.
Forgive me. Mark Kirby is sending it to Michael Peters?

13:48:32-13:49:38 Page 163

A. Yes.
Q. Okay. Forgive me. I did not -- unintentional.
All right.
The second sentence after "Mike":
"Yellow product is safe as long as it is installed correctly (bonded) but many installers do not do this and some areas do not require bonding."
That kind of goes back to that question I had earlier about the AHJ.
If the AHJ approves a gas delivery system, does that mean that it has been installed according to code?
A. If the AHJ approves an installation, it means that the AHJ has approved the installation.
If the installation has been done in accordance with code, it has been performed in accordance with code.
Those are two different things, and oftentimes they overlap, and it's possible for them not to overlap.
Q. All right.
The next sentence:

13:49:58-13:50:33 Page 164

"Since the black products are safer when they haven't been bonded, we believe it is in the best interest of our customers to only offer black CSST product."
So again, that comes down to that quantification issue.
Is there any quantification to demonstrate that black products are safer when they haven't been bonded as compared to yellow CSST when it has been bonded and grounded pursuant to a D&I guide?
MR. KURTZ: Object to form.
A. And what is your question?
Q. Have there -- has there been any students to support or quantify that relationship?
MR. KURTZ: Object to form, asked and answered.
A. There have been studies associated with specific individual products -- so from one of the three manufacturers, if not more -- that quantify the amount of electrical insult the gas systems can take before a perforation occurs to their -- the -- the specific yellow product, for example TracPipe.
And the -- I have not seen a direct comparison for the same configuration of a house and

13:57:00-13:57:48 Page 169

National Electric Code dealing with CSST.
Do you agree with that?
A. As to your description of what the document is? Yes.
Q. All right.
I would like you to turn to the third page.
On the bottom it would be George -- TITE_GEORGE 11645.
A. Yes.
Q. "Emergency Nature.
"There have been numerous accounts of damage to corrugated stainless steel tubing from both direct and indirect lightning strikes on or near residential structures containing this type of gas piping system."
Do you agree with that statement?
A. I -- you know, I don't have independent information to -- to agree or disagree with it. I mean, this is the representation of Mr. Torbin, I believe, and -- and I don't -- I --
Q. All right.
A. I don't have the capacity to agree or disagree with it.
Q. Fair enough.

13:58:04-13:58:48 Page 170

"The damage is consistent: An arc-induced perforation is created through the tubing wall from a voltage imbalance between the CSST and another electrically conductive system in close proximity (see Attachment E)."
Now, there is no differentiation in this document between yellow-jacketed CSST from Omega Flex, Titeflex or Ward Manufacturing.
Would you agree with that?
A. Let me take a look at the --
Q. Please do.
A. I'm on Page 3 here. Let me look at the beginning of this one second.
Q. Okay. I'll tell you what. I'll strike that, and I'll make it a little bit easier. All right?
Just this -- those two paragraphs under "emergency nature," do you agree, in those two paragraphs, with regard to what's going on, the description of the damage as per Robert Torbin, there is no differentiation between TracPipe, Gastite or WardFlex CSST?
MR. KURTZ: Object to form.

13:59:43-14:00:31 Page 171

A. I agree that the words do not include the names of the manufacturers in -- in the paragraph and one or two lines that you have identified.
MR. SCHUMACHER: Okay. I'm going to show you now what I've marked as Exhibit Number 19.
(Document marked as Kytomaa Exhibit 19 for identification)
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. So you raised this point in your report, that Robert Torbin attempted to -- the TIA 941 in an effort to change the National Electric Code to include a direct bonding requirement, correct?
You reference that in your report.
A. I think my reference is much more broad than what you just said, but I have a reference associated with Torbin and the National Electrical Code, yes.
Q. All right.
The National Electric Code, back in 2009 -- and even today -- has refused to make that change. They have refused to add a direct bonding requirement for CSST, correct?
A. My understanding is that the -- the

14:01:20-14:02:13 Page 172

National Fire Protection Association that oversees both NFPA 54 and NFPA 70 -- so 54 is the National Fuel Gas Code, and 70 is the National Electrical Code -- work hard towards harmonization of the various standards. And, to that end, they pay a great deal of attention to the scope of each of these standards.
And the way I understand -- I understand what occurred here is that there was a -- a recognition of this proposal, first of all, and -- and a -- a procedure within the NFPA to make a determination as to whether this question falls under the scope of the National Electrical Code or the National Fuel Gas Code.
And I think that the determination was made between these three entities -- so essentially the two working committees, and the National Fire Protection Association -- that it really falls under the scope of the -- the fuel, National Fuel Gas Code, or NFPA 54.
I'm not quite sure I would answer the question the way you suggest. I mean, I don't think that there was a refusal or that sort of thing. It is more of a -- an exercise of a body working

14:02:35-14:03:16 Page 173

together and recognizing, you know, what makes the most sense and coming to a conclusion in that particular way.

Q. Well, then let's turn to Page 2 of 3 of Exhibit 19.

A. Yes.

Q. Let's go down to the third full paragraph where it starts "Secondly..."

A. Yep.

Q. "... the council notes that, in addition to jurisdictional/scope concerns, the balloting on the TIA raised questions regarding whether the proposed bonding requirements for CSST have been adequately substantiated."

So as of 2009, August 6th, NFPA, this technical committee, still has questions as to whether or not the effectiveness of bonding and grounding of CSST has been adequately substantiated, agreed?

A. So if I understand this document correctly, this is a document, a document that reflects the deliberations of members of the working committees associated with the National Electrical Code.

14:04:07-14:05:12 Page 174

And -- and those members, according to the paragraph that you just cited, seem to have raised questions of scope.

So those are the jurisdiction -- jurisdiction and scope, those are the questions that I raised to you a moment ago. So -- so those were -- that's what I was referring to. And -- and then additional questions were -- were raised regarding the effectiveness or the adequacy of -- of bonding. And, you know, and -- and I think that the -- it may well be that the NEC did, indeed, have such a question. I -- I don't have information to corroborate or -- or show that that's not correct. But -- but what I do know is ultimately that this fell under the umbrella of the NFPA 54, and so the question really is what did -- what occurred under NFPA 54, the National Fuel Gas Code, and what did -- what did the NFPA ultimately do about all of this.

And, you know -- and I think the story there is that -- is that efforts were taken, with funding from the Fire Protection Research Foundation, to -- to perform two studies:

The first study was the study that was carried out by SEFTIM, that was -- that provided

14:05:42-14:06:48 Page 175

guidance for what I would call Phase II, which was the work that GTI carried out.

***Q. Do you know if the CSST manufacturers ever pointed out to the public or revealed to the public that there were still questions about the sufficiency or adequacy of bonding and grounding as an effective means of protecting CSST in the 2009/2010 time frame?**

MR. KURTZ: Object to form.

THE WITNESS: Could you read that question back to me, please.

*(Record read)

A. Yes, I -- I believe they -- they did.

Q. Through what means?

A. Through the D&I guide, which -- which talks about the requirements associated with bonding, and why, and -- and furthermore, there was substantiation at that time, already --

Q. From where?

A. From work that was performed by Kraft and Torbin that demonstrated that -- that, indeed, bonding and grounding was effective.

Q. Did Kraft and Torbin have any actual lightning insult testing done at LTI to support

14:07:22-14:07:54 Page 176

their bonding and grounding?

A. I know they had -- they performed analysis, and -- and part of that analysis may have also included some testing, but I don't remember exactly.

Q. All right.

So when we say "analysis," what does that mean? Does that just mean they're -- they're doing SPICE computations, or -- or similar type of circuit analysis?

A. Yes. What I mean by analysis is the SPICE type of analysis that then uses electrical characteristics of various components in question.

Q. Okay. So the Kraft-Torbin paper, though, that was released in about -- in the 2007 time frame, correct?

A. I don't remember the exact year, but it was around then.

Q. But that's the point. Here we're in 2009 and we still have the NFPA technical committee questioning the validity of the bonding and grounding as an effective means of protecting CSST.

MR. KURTZ: Object to form.

A. Yeah. I don't exactly know.

I mean, my understanding of this document

14:13:13-14:13:48 Page 181

Q. All right.
All right. Let's go -- I'm just going to go to the last paragraph: "Some of the evidence provided..."
A. Yes.
Q. "Some of the evidence provided indicated that some incidents from lightning energized other metal, such as a metallic chimney liner, that was in close proximity to the CSST and therefore became the source of the arc to the CSST."
Now, we did test that earlier, correct, that potential hypothetical?
A. We have, yes.
Q. All right.
"It was not clear that when such metal (such as structural metal, ventilation ducting, flashings, roof vents and other piping determined not likely to become energized from the electrical system and therefore not bonded)..."
And that's the issue I have with you; that under the NEC, which talked about systems that had a likelihood of becoming energized, if you have a flue

14:14:13-14:14:48 Page 182

pipe from a fireplace with no electrical connection, there is no bonding requirement because it's not likely to become energized except by lightning, correct?
MR. KURTZ: Object to form.
A. I'm sorry.
If it's a flue pipe that is connected to an energized fireplace, for example, it will be grounded through the appliance.
Q. I agree. But I said -- I said no electrical connection.
A. Okay. No electrical connection.
So in that situation it is possible for the flue pipe not to be grounded, yes.
Q. Right. And that creates a difference of potential if it becomes energized when it's in close proximity to yellow-jacketed CSST if it's bonded and grounded, correct?
A. You're giving me insufficient information to completely get the picture here.
Q. Okay. Can you conceive of a situation where you would have a flue pipe, not bonded and grounded, being in close proximity to a piece of yellow-jacketed CSST that is bonded and grounded?

14:15:17-14:15:49 Page 183

Okay? That -- I just want to start with that scenario. All right?
If that flue pipe becomes energized, it's going to be seeking a path to ground. Would it not still have the potential for arcing over to the bonded CSST?
A. So if the CSST is actually connected directly to the fireplace, which is often the case, so they actually have a intermetallc connection, then there would be no arc --
Q. Okay. And --
A. -- in that situation.
Q. A different scenario.
A. Okay.
Q. I'm not talking about, like, the actual run for the fireplace. Just another -- a run to another device that is to be in close proximity in the metal flue pipe.
A. Uh-huh.
Q. If the metal flue pipe becomes energized, and it's close enough to that yellow-jacketed CSST, even though bonded and grounded, there still would be a difference in potential, correct, between the energized flue pipe and the yellow -- bonded yellow

14:16:11-14:16:56 Page 184

CSST?
There would be a difference in potential?
A. So in that very unusual scenario that is -- that is remotely possible, yes.
Q. Okay. And, in fact, since the yellow-jacketed CSST is bonded and grounded, it has a very low resistance; it's actually a very good path for -- to ground for the energy from that energized flue pipe?
MR. KURTZ: Object to form.
A. So in that unique scenario that you've just described -- which, I mean, there may be many other paths that actually are better paths for -- for the lightning energy to take, because lightning energy follows all the possible paths that are available to it -- that there is a remote possibility, albeit highly unlikely, that that can occur.
Q. And we're going to discuss it a little bit more later, but the -- you referenced the 2016 article from Tom Eagar, Dr. Eagar, who talks about that exact scenario and says you could actually -- by having it bonded and grounded, you could actually increase the possibility of an arcing event because

14:17:25-14:18:13 Page 185

of the -- you've lowered the resistance for the CSST, creating a bigger difference in potential. You can actually attract an arc.

A. I mean, you can identify, you know, sort of the -- you can look for unique and unusual configurations, and -- and the probability of the more you look, the lower the probability of those particular occurrences would be. But there are unusual, and so let's say rare, configurations where that can occur, where you can have an energized flue pipe arc over to CSST in that situation.

Q. But that's the point. There are scenarios out there where bonding and grounding of the yellow-jacketed CSST does not prevent an arcing event.

MR. KURTZ: Object to form, and asked and answered.

A. Well, my point is that in the vast majority of cases it is beneficial. And you're looking for the -- sort of the miniscule probability situation that you're identifying here where that might occur.

MR. SCHUMACHER: Objection, nonresponsive. I'm going to show you now what I have -- (Phone rings)

14:19:14-14:21:45 Page 186

MR. SCHUMACHER: I'll show you now what I have marked as Exhibit Number 20.

(Document marked as Kytomaa Exhibit 20 for identification)

BY MR. SCHUMACHER:

Q. Have you seen this document before?

A. Yes, I believe I've seen this document.

Q. All right.

This is -- we're back to the NFPA 70 task group on CSST, correct?

So that's -- and by "NFPA 70," that's the National Electric Code task group on CSST, right?

A. Yes.

Q. All right.

I would like you to turn to Page 3 of 4.

I would like you to go to the last full paragraph.

A. To the one that's headed "Technical Substantiation"?

Q. Yes.

A. Okay.

Q. And then the -- but the next paragraph starts with "concerned."

A. Yeah.

14:21:59-14:22:39 Page 187

Q. "Concerned with a lack of technical substantiation, the CSST task group concluded that a research program was necessary to 'identify safe methods for the installation of CSST to protect against lightning-induced failure with consequent gas leakage.' The CSST task group report identified, among the areas that should be addressed, the following:"

All right. Let me start there.

So this is 2010, correct? March 3rd of 2010 is the date of this decision?

A. Yes.

Q. The Torbin and Kraft white paper was 2007, available in the industry for review?

A. I don't remember the exact date.

Q. Okay.

A. But around then.

Q. Okay. But the CSST task group is still indicating there is still insufficient information to substantiate the efficacy of bonding and grounding, and now they are requesting that a protocol be created for a testing, correct?

MR. KURTZ: Object to form.

14:24:02-14:24:41 Page 188

A. You know, I think the document speaks for itself, but I -- I can't add -- add to that.

Q. That's fine. So the document does speak for itself, but let's look at the first point.

So the first area of inquiry that testing should be done to:

"Validate whether or not bonding of CSST is an adequate solution to the lightning exposure problem."

That's one of the first things they're looking to test, do you agree with that, at least from the document?

MR. KURTZ: Object to form.

A. So the -- the context that I'm lacking here is in light of the fact that this is a document that is associated with the -- the working group of the National Electrical Code, whether the people that are writing this document are -- let me -- let me restate.

How are the authors of this document defining "adequate solution to lightning exposure problem"? Like, for example, are they intending, or are they expecting that whatever is used is used for the CSST -- for example, bonding of the CSST -- is

14:25:23-14:26:06 Page 189

intended to protect the house from lightning insult, for example, which would be a higher standard in the sense that CSST is not there to protect a house from lightning. And so -- so there is context here that I'm lacking that prevents me from really answering your question correctly.

Q. That's fine.

This report ultimately led to SEFTIM I, the Phase I testing conducted by SEFTIM, correct?

A. So, you know, I don't know whether it is this report, but ultimately -- and the date of the SEFTIM I report will speak for itself -- but there was a Fire Protection Research Foundation project that then funded -- funded the SEFTIM I project.

Q. Okay. Well, let's turn to the next page, then --

A. Sure.

Q. -- Page 4 of 4.

The next point that they are looking to test:

"If bonding is the solution, validate how bonding should be done."

Did I read that correctly?

A. You did.

14:26:20-14:26:42 Page 190

Q. All right.

The next bullet point:

"If bonding is the solution, validate the size of the bonding jumpers."

Did I read that correctly?

A. You did.

Q. The next one:

"Determine if bonding should be done at a location or locations other than where the gas pipe enters the building."

Did I read that correctly?

A. You did.

Q. Last one:

"Determine if alternate methods could be used for safe installation, i.e. separation from other equipment."

Did I read that correctly?

A. You did.

Q. All right.

So how -- and this is March of 2010. If the -- the technical group on -- or the task group on CSST is still asking these questions about "what's the right size of a jumper," "what's the separation," how can a manufacturer out there be

14:27:09-14:27:48 Page 191

saying "bonding and grounding is safe" --

MR. KURTZ: Objection.

Q. -- if it hadn't been validated as of 2010?

MR. KURTZ: Object to form, misstates evidence, argumentative.

A. I mean, one -- one way for -- for that to be the case is for the work done by Torbin to have actually arrived at those very answers.

Q. This is 2010. That information was available. That's 2007.

A. I understand.

Q. They considered it, and they said, "It's still not" -- "insufficient to validate bonding and grounding as being a sufficient means of protecting CSST," correct?

MR. KURTZ: Objection. Let the witness finish -- finish his answer to the question.

A. I'm not sure what I'm answering right now.

MR. KURTZ: All right.

MR. SCHUMACHER: Well, then we'll move on.

Q. Let's go to Page 4 of 4, the first full paragraph after that.

A. Yep.

Q. Let's go down to the one, two, three --

14:28:10-14:28:45 Page 192

fourth line after August 6th of 2009. The sentence starts, "Because so little..."

A. Yes.

Q. "Because so little information was provided to the task group, it is unclear whether and to what extent a problem exists. The paucity of the submissions to the task group, however, confirms the council's view that the concerns that have been raised about CSST should be addressed and resolved."

Did I read that correctly?

A. I do (sic).

Q. And, in fact, as of this group they were contemplating pulling approval of CSST absent some validation of bonding and grounding, correct?

MR. KURTZ: Object to form and foundation.

A. I don't recall -- I don't recall that specific matter.

Q. Well, let's go down to the end of Page 4 of 4, the one, two, three, four -- fifth line from the bottom. In fact, we'll go up a little bit further.

Do you see where it says "October 6th," 2010 (sic)?

14:29:06-14:29:44 Page 193

A. Further down?
Q. A little bit -- a little bit further up.
A. Oh, yeah. I see it, yep.
Q. All right.
"Whether through the auspices of the Research Foundation or through other means, it is incumbent upon the manufacturers or others promoting the use of CSST in gas piping systems to provide independently validated and reliable technical substantiation demonstrating that CSST can be" used safely. "If substantiation is not provided, the technical committee on the National Fuel Gas Code must consider prohibiting the use of CSST in NFPA 54, National Fuel Gas Code."
Did I read that correctly?
A. You did.
Q. So there was a consideration of pulling it, pulling the -- prohibiting the use of CSST absent demonstrating the validity of this? As of 2010.
A. Well, that's not how I'm reading it.
I'm saying that if sub -- substantiation is not provided, then that kicks on this process of the

14:30:17-14:47:06 Page 194

NF -- the Fuel Gas Code then considering prohibiting the use of CSST. And so, you know, I disagree with your representation.
MR. SCHUMACHER: That's fine.
I'll tell you what. We've been going about an hour again. Why don't we go ahead and take a break.
THE VIDEOGRAPHER: The time is now 2:30, and we're off the record.
(Recess taken)
THE VIDEOGRAPHER: The time is now 2:46, and we're back on the record.
MR. SCHUMACHER: All right.
Dr. Kytomaa, I am showing you what I have marked as Exhibit Number 21.
(Document marked as Kytomaa Exhibit 21 for identification)
MR. SCHUMACHER: And I'll tell you right now, that is not the entirety of the document. That's -- that's the SEFTIM I report. It's about 285 pages, so I just took out some excerpts.
Q. But are you basically familiar with the -- that document, the SEFTIM Phase I report?
A. So I've reviewed the report, but not

14:47:26-14:48:12 Page 195

recently.
Q. Okay.
A. And so I'm generally familiar with it, but certainly have not committed it to memory.
Q. Understood.
You had said earlier that some -- something you had relied upon, or the industry had relied to quantify the effectiveness of bonding and grounding was the SEFTIM report, so I wanted to discuss this with you a little bit.
I would like you to look at page -- well, at the bottom it's got a Bates number TITE_GEORGE 23977.
A. Yes.
Q. All right.
The very bottom paragraph, "The study then concentrates..."
A. Yes.
Q. All right.
"The study then concentrates on indirect lightning (partial lightning current) and induced lightning. Direct lightning is also addressed, even if, in" this case -- "in the case of direct strike

14:48:34-14:50:25 Page 196

to the structure, the presence of a lightning protection system as required by NFPA 780 needs to be considered."
So NF -- this was essentially limited at this point to testing for indirect strikes.
Is that a correct statement?
A. So this report, if you look at the very top there, includes three things: A literature review, consultation with experts and a gap analysis. So -- so this report does not address testing.
Q. Okay. Well, fair enough.
The review -- or the scope of this was limited to indirect strikes, not direct strikes, though.
Do you agree with that?
A. I'm not sure I understand your question. The -- so just ask it again, I guess. I mean, I'm struggling with your question.
Q. I'll withdraw it. Don't worry about it. Let's move on to something else.
Let's go to page GEORGE 23980 of Exhibit Number 21. Let's go down to the bottom:
"The text concludes by answering the initial questions raised at the origin of

14:55:38-14:56:38 Page 201

MR. CASPER: Object to the form of the question.

A. The position of the -- say the bonding and grounding clamp on the gas service will influence the -- what that electrical circuit looks like from a standpoint of how the gas system responds to the influx of lightning energy. And so if you change the location of the bonding clamp, it will change the current, and I think that the -- the voltages will be different, as will -- as will the currents. And then the question is whether that change is -- is substantive or not. And that depends on exactly what the change was, and you need to analyze that.

Q. Understood.

I mean, as a practical matter, your testimony is that if you bond and ground the system, it's providing an additional path to ground, so you're going to allow for some dissipation of energy from the system, correct?

A. The function that bonding typically does -- provides is -- is diversion of energy away from the gas system. So it's not so much a dissipation; it's actually redirecting, if you will, and -- and also causing the currents in the gas lines themselves to

14:57:09-14:58:06 Page 202

be lower, and therefore the voltages to be lower, to reduce the likelihood of an arc to form in the first place.

Q. You're attempting to provide a path to ground before an arc can occur between another metallic system with a difference in potential?

MR. CASPER: Object to the form of the question.

A. I wouldn't put it quite in those -- in those terms.

I mean, the only piece that I agree with is that the bonding and grounding provides another path to ground.

Q. All right. Let's go back to -- I think it's Exhibit 21, GEORGE 23981.

Let's go down to the second full point, "Alternatively..."

A. Yes.

Q. Okay.

"Alternatively CSST specifically designed to withstand an enhanced lightning surge may be considered, provided their behavior is supported by tests."

Did I read that correctly?

14:58:21-14:59:02 Page 203

A. Yes.

Q. All right.

I mean, that's essentially come up with a new product.

MR. KURTZ: Object to form.

Q. Correct?

A. I'm not sure I read it quite in those terms. That is -- you know, it says that the CSST should be "specifically designed to withstand an enhanced lightning surge," and that that "may be considered," but --

Q. We're back to that argument we had earlier about my definition of "design" versus your definition of "design"?

A. Yeah. Right.

Q. When you include "design" as amending the design and installation guide to effect the bonding and grounding, you consider that potentially a change in the design of the product?

A. It's part of the design, that's correct.

Q. Okay. So -- but there's a difference there. There's a difference in a design of a product versus a design of the system, correct?

A. The -- the product itself that you buy --

14:59:36-15:00:14 Page 204

so, in this case CSST -- is part of a system in a home.

Q. All right.

Let's go down to the last bullet point:

"Bonding with Number 6" -- I'm just going to call it gauge -- "needs to be validated by more tests since the tests published so far do not cover the complete picture, even though Number 6" gauge "is the normal size for equipotential bonding conductors and should be enough."

Would you agree that as of the writing of this report the -- there was more testing required or requested by SEFTIM to validate that Number 6 gauge wire was sufficiently validated for bonding purposes?

MR. KURTZ: Object to form.

A. Yeah. I mean, I think it's important to note that this document, the entire SEFTIM document, is a paper study. So it, itself, did not attempt to perform any testing.

And so one of the conclusions -- which is, let's say, in part expected, given the scope of the work that SEFTIM was given -- was that testing would

15:24:36-15:25:54 Page 217

(Document marked as Kytomaa Exhibit 26 for identification)

BY MR. SCHUMACHER:

Q. Have you seen that document before?

A. Yes.

Q. All right.

Mr. Goodson, in Exhibit 25, "A Hidden CSST Electrical Danger," points to certain inaccuracies in the GTI report.

Would you agree with that statement?

MR. KURTZ: Object to form.

Q. And you can look specifically on Page 3 of Exhibit 25, the second -- or, I guess, the first full paragraph:

"The hidden danger that arises from the use of CSST starts when one realizes that the above GTI numbers are incorrect."

Specifically, he was referring to the resistance numbers; is that correct?

A. Yes.

Q. All right.

Fair to say that the inaccuracy of the resistance numbers contained in the GTI report was not picked up by any peer review that was conducted?

15:26:27-15:27:31 Page 218

A. In the -- in the first issue of the report, that's correct.

Q. All right.

Well, let's, then, look at Exhibit Number 26, the GTI report, the revision.

A. Yes.

Q. And let's please go to Page 1, the "Executive Summary."

A. Yes.

Q. All right.

The first line of the second paragraph:

"It is important to note that the incorrect values were not used in any critical calculations or simulations."

The -- the original GTI report had a resistance, I want to use an example, of 22.2 ohms whereas it was off by a factor of 10. It should have been 2.22 ohms.

Is that -- is that correct?

A. I would be happy if you sort of show me the documents. I know that you can't show me the documents because you don't have both, but, you know, I don't remember by heart those numbers. So I can't -- I can't confirm, but -- but, you know, I think that the documents will speak for themselves.

15:28:03-15:28:33 Page 219

Q. Okay. That's true. That's very true.

So -- all right. I'll move on then.

Let's move down the executive summary.

Page 3 of Exhibit 26 starts:

"There are two areas that the testing plan..."

A. Yes.

Q. Do you see where I am?

A. Yeah.

Q. "There are two areas that the testing plan explicitly does not address."

The first bullet point:

"The sustained conduction of power line fault current by CSST is outside of the scope of this project."

A. Yes.

Q. Okay. Now, that's residential household current; is that correct?

A. Yes.

Q. All right.

The next line:

"This condition has been shown to cause" perforations -- or "perforation in

15:28:46-15:29:19 Page 220

prior studies."

Did I read that correctly?

A. Yes.

Q. All right.

The next bullet point:

"Direct lightning strikes are outside the scope of this project."

Did I read that correctly?

A. Yes.

Q. "Indirect strikes and induced currents in various residential structures are far more numerous than direct strikes, providing motivation to deal with this category of event."

Did I read that correctly?

A. You did.

Q. All right.

So none of the calculations or testing or circuit analysis contained in the Exhibit Number 26, the GTI Revision A report, analyzed the effectiveness of bonding and grounding of CSST with regard to, number one, household residential current, correct?

A. Although this document does state that --

15:29:49-15:30:38 Page 221

you stopped short of the sentence. It says:
"This issue is properly addressed by circuit protection devices that detect the flow of fault current and disconnect it at the source."
So the -- I mean, it's addressed essentially separately by these kinds of devices, so that's for the first part.
Q. All right.
But please answer my question, though.
There's -- nothing in Revision A provides testing analysis, circuit analysis with regard to the effect of household residential current on yellow-jacketed CSST and its effect on bonding and grounding?
A. The -- yeah. This -- this page, this particular bullet does say that this report does not look at "the sustained conduction of power line" faults through CSST.
Q. Understood.
A. That's correct.
Q. And then the next bullet point, the testing plan explicitly does not address -- direct lightning strikes are also outside the scope of this project,

15:31:06-15:32:00 Page 222

correct?
A. I think -- so that's what this line says, but my review of the report does -- I would say that this is not a -- a complete description of what the GTI report does in the sense that -- that really the distinction between indirect and direct strikes are whether the full electrical energy associated with the lightning discharged impacts the structure as opposed to a partial impact. You know, that's typically the division that you see in the lightning literature.
And my review of the conditions that were analyzed by the GTI report -- that are, you know very quantitatively summarized -- show that they actually do look at discharges that are consistent with the full energy of a lightning discharge, and -- and so they -- and they do so by subjecting the -- let's say the fuel gas system with, let's say, an injection of this -- this electrical energy at the point of entry of the gas system.
So I would say that -- that I wouldn't quite describe the -- the scope of the GTI report as -- as direct lightning strikes being outside of the scope, since they do include analyses within the

15:32:32-15:33:23 Page 223

scope of the report that are consistent with direct strikes.
Q. But there was no testing protocol directed at direct strike effects on bonded and grounded CSST?
MR. KURTZ: Object to form.
A. I would say that generally there was, because the -- the -- the -- the reason why there was, was that -- is that a lot of the testing was a characterization of the electrical properties of components in households associated with the fuel gas system, and then many of the conclusions are really based on detailed analyses in the GTI report that -- that include the total energy of -- of return strokes -- albeit total energy that it is -- that is introduced into the -- the structure at the point of entry of the gas service. And so -- so, you know, that is -- you know, I think that some of the scope of the GTI report considers situations that one might call, in part, direct lightning strikes to the system.
Q. So to the extent that a current analysis may have represented the current from a direct strike, it would theoretically fall under the scope

15:33:54-15:36:50 Page 224

of this report?
A. Well, no. No. It falls under the scope of this report, not theoretically, because they -- they do, you know, quantify and -- and present the results, and the results are based upon the combination of testing and analysis.
MR. SCHUMACHER: All right.
I'm going to show you what I am marking as Exhibit Number 27.
(Document marked as Kytomaa Exhibit 27 for identification)
MR. SCHUMACHER: It's Tab 30, Counsel.
THE WITNESS: Thank you.
BY MR. SCHUMACHER:
Q. Have you seen any of these documents before?
A. Yes, I've seen some of these.
Q. If you could please turn -- at the lower left-hand corner there is the numbered pages one -- like Page Number 1 is 158 of 274.
Do you see that?
A. I do.
Q. I would like you to turn to 168 of 274 --
A. Okay.

15:44:05-15:44:57 Page 229

A. Yep.
Q. "PowerCET chose to use their own measured value of CSST resistance for these simulations..."
A. Yep.
Q. Did I read that -- well:
"... 40 milliohms per meter" --
A. Yep.
Q. -- "for one-inch diameter and 66 milliohms per meter for" half-inch "rather than those provided by LTI."
A. Yep.
Q. Did I read that all correctly?
A. Right. You did.
MR. SCHUMACHER: I'm going to show you what I am marking as Exhibit Number 28.
(Document marked as Kytomaa Exhibit 28 for identification)
BY MR. SCHUMACHER:
Q. Have you seen that -- I'll let you just housekeep.
I'm showing you now what I've marked as Exhibit Number 28.
Have you seen that document before?

15:45:48-15:46:26 Page 230

Have you seen that document before?
A. I may have seen this document. I mean, I certainly haven't reviewed it recently.
Q. Okay. Well, this is a -- the press release from Jim Narva, National Association of State Fire Marshals --
A. Yes.
Q. -- executive director, dated July 18th of 2012; is that correct?
A. Uh-huh.
Q. All right.
A. Yes.
Q. That the CSST manufacturers were -- or the National Association of State Fire Marshals was launching a nationwide yellow CSST safety campaign with the CSST manufacturers.
MR. KURTZ: Object to form.
A. I think the title of this document is, "National Association of State Fire Marshals (NASFM) Launches Nationwide Yellow CSST Safety Campaign."
Q. All right.
Was this supported by the CSST manufacturers, financially and otherwise?
MR. KURTZ: Object to form and foundation.

15:47:10-15:48:09 Page 231

Q. If you know.
A. I -- I don't know anything about the funding structure associated with this -- this document.
Q. That's fine.
A. Yeah.
Q. Well then, let's -- at least date-wise, you would agree with me, if the original GTI report was not released until 2013, that this campaign started prior to the release of the GTI report?
A. So, yes. I mean, the...
Q. The original -- well, let me ask this:
The original GTI report was issued on September 5th of 2013, correct?
A. That's my understanding, yes.
Q. All right.
From Exhibit 26?
A. Yes. I mean, on the front page it has the -- the two dates. It's got the report issued September 5th, 2013, and then the revised report issued October 12th, 2015.
Q. All right.
So the testing and validation that was supposed to be set forth by the GTI report had not

15:49:18-15:50:29 Page 232

come out prior to July 18th of 2012, correct?
MR. KURTZ: Object to form.
A. The -- that's right. The GTI report has a date that is later than July 18th, 2012.
MR. SCHUMACHER: I'm showing you now what I have marked as Exhibit 29.
(Document marked as Kytomaa Exhibit 29 for identification)
BY MR. SCHUMACHER:
Q. Have you seen that document before?
MR. SCHUMACHER: It's 36, Counsel.
A. I may have seen this document, but I have not reviewed it recently.
Q. All right.
I'm just going to go to the very last sentence of the second full paragraph, "These tests..."
Do you see where I am?
A. I do.
Q. "These tests, however, do not evaluate CSST for the threats of electrical arcing associated with direct lightning or household electrical system faults."
Did I read that correctly?

16:21:29-16:22:50 Page 245

were not included in the GTI report?
A. My understanding is that the GTI report presented all of the circuit analyses that they -- they performed.
Q. So if they ran an analysis, it's contained in the report?
MR. KURTZ: Object to form.
A. I expect there would be either as -- you know, as a statement of what the input parameters were and -- and what the findings were, which may appear either as a -- let's say an entry in a table or a data point in a graph, that sort of thing.
Q. All right.
Let's go back to Exhibit Number 34, please.
A. Yes.
Q. Now, is this basically an update by Bryan Haslam and Tom Eagar of the 2015 document we were looking at a few moments ago?
MR. KURTZ: Object to form.
Q. That one, Exhibit 32.
A. 2.
It is a -- this is a -- a paper -- Exhibit 34 is a paper entitled "Variation in Lightning Simulations to Assess Grounding Safety of

16:23:45-16:24:10 Page 246

Corrugated Stainless Steel Tubing (CSST)," and Exhibit 32 is a paper, a different set of authors, entitled, "Fire Safety of Grounded" Corrugated "Stainless Steel Tubing in a Structure Energized by Lightning."
Q. All right.
Let's look at Page 1 of Exhibit Number 34, in the first page abstract --
A. Yes.
Q. -- about halfway down, a little more than halfway down, "Our results show..."
A. Yep.
Q. "Our results show that there are cases where grounding may prevent perforation" --
A. Yep.
Q. -- "cases where grounding may reduce the damage but not prevent perforation" --
A. Yes.
Q. -- "and cases where grounding increases the chances of perforation."
Did I read that correctly?
A. Yes, I see that.
Q. And that was based on some 2,560 simulations they ran?

16:24:29-16:25:02 Page 247

MR. KURTZ: Object to form.
A. Yes. I mean, it was based on 2,560 simulations they represent they ran, and many of which would be, let's say, fictitious in the sense that they don't necessarily represent parameters that would be real from a standpoint of what a house would actually have as parameters.
Q. All right.
Let's go to the next line after I just read:
"Our results further show that for lightning strikes with peak current greater than the median, there was never a case where grounding could have prevented perforation."
Well, the median is 50 percent?
A. Yes.
Q. All right.
So:
"Our results further show that for lightning strikes with peak current greater than" 50 percent, "there was never a case where grounding could have prevented perforation."

16:25:16-16:26:46 Page 248

Is that an accurate statement --
A. No.
Q. -- based on their findings?
A. Well, I -- I don't think it's an accurate statement, but that's what the document says.
Q. Okay. Then the last line:
"In particular, we show grounding of CSST will not prevent fires when assaulted by lightning with any reasonable degree of certainty."
Did I read that accurately?
A. That's what that says.
Q. All right.
If you could pull out Exhibit Number 3, your report. Let's go to Roman numeral xxiii. Conclusion Number 1:
"TracPipe, WardFlex and Gastite CSST are safe and effective products for distributing fuel gas throughout a structure when they are installed and maintained in accordance with the manufacturers' instructions that are provided in the design guide and installation instructions (D&I guides)."

16:27:09-16:28:06 Page 249

First of all, CSST being "effective," that just essentially means they are able to run gas to the appliances in a home without leaks.
Is that a fair statement?
A. In part, yes.
Q. Okay.
How do you define "safe"?
A. Safe in the sense that it provides considerable benefits in light of the -- you know, the recognized risk that -- that distribution of fuel gas always has risks, as exemplified, for example, by -- by the -- the fact that gas piping, specifically black iron piping, often leaks, and so -- so you need to -- to make sure that you have ways of minimizing the leaks. And -- and CSST does that.
Q. How do you define "safe" with regard to the ability of TracPipe, WardFlex and Gastite to withstand the electrical current from a lightning strike?
A. These products need to be designed in such a way as to be able to withstand a reasonable -- conditions that might occur quite often, and not incur a leak. And -- and so that is the process

16:28:46-16:29:16 Page 250

that the manufacturers have undertaken, and -- and that's culminated in certainly the product itself, but also the directions and the training programs that they have for proper installation.
Q. I want to go down to Number 5:
"Grounding and direct bonding of TracPipe, WardFlex and Gastite, as prescribed by their D&I guides, significantly reduces the likelihood of arcing between the CSST and another conductor, such as a metal duct, water pipe, or a branch circuit wiring in the event of lightning."
A. Yes.
Q. Quantify for me "significantly."
Is it five percent? 10 percent? 50 percent?
A. I think that goes on a case by case. And I've quantified it actually -- in answer to your question, I would turn your attention to my analysis in this case, where the analysis is performed with and without a bonding wire, and you could -- you could calculate the percentages for yourself.
Q. But that's based on those two specific

16:29:43-16:30:40 Page 251

homes?
A. Yes.
Q. There is no way to quantify that number across the board for all WardFlex CSST homeowners?
MR. KURTZ: Object to form.
A. Yeah. So that is not something that you can, let's say, quantify with a single number, because it's very case specific. Each installation is different. Each product from each manufacturer is different. And so you would have to take into consideration the very details that we quantified through our inspections of the nine homes that I've documented in -- in my report.
Q. I would like you to turn to the next page of your Exhibit Number 3, xxiv, Item 7:
"Assertions by the plaintiffs that statements related to bonding and grounding made by Omega Flex, Ward and Titeflex were 'false'" --
A. Yep.
Q. -- "and 'not in accord with the facts' are unsupported and inaccurate."
What statements specifically are you referring to?

16:31:48-16:32:48 Page 252

A. So I will turn your attention to Page 168 of my report.
Q. I'm there.
A. And -- and so -- so under Section 7.3, I have -- let's see -- one, two, three, four full paragraphs. I'll go through each of them in answer to your question.
So here, under 7.3.1, there is a reference to:
"... Exhibit E (Electrical Bonding of CSST Systems by Cutting Edge Solutions). Based on this document, the plaintiffs incorrectly suggest that because grounding and direct bonding were intended for reducing the risk of damage of indirect lightning, that grounding and direct bonding are limited to that function."
So that's -- that's the first one.
Second one, under 7.3.2 --
Q. Well, let me back up before, if you don't mind, on 7.3.1.
A. Uh-huh.
Q. The last line there:
"Contrary to the plaintiffs'